INTERNATIONAL CRITICAL TABLES
OF
NUMERICAL DATA
PHYSICS, CHEMISTRY AND TECHNOLOGY

INTERNATIONAL CRITICAL TABLES
OF
NUMERICAL DATA,
PHYSICS, CHEMISTRY AND TECHNOLOGY

Prepared under the Auspices of the International
Research Council and the National
Academy of Sciences

BY THE
NATIONAL RESEARCH COUNCIL
OF THE
UNITED STATES OF AMERICA

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PREFACE BY THE BOARD OF TRUSTEES

The publication of International Critical Tables at a price that would make possible a world-wide distribution required that the undertaking be financed by those appreciating its importance and in a position to make the necessary investment. Some 244 firms and individuals and two of the larger Foundations have provided the sum of $170,000 required for the compilation.

Many individuals have given freely of their time and effort in helping to obtain the funds necessary for the compilation of this work. In addition to those who have been responsible for assigned territory, there are a large number of others in industrial organizations which have supported the enterprise, and grateful acknowledgment is made of their interest and help, quite as much as if it were possible to give here the complete list of names. Indeed, it is impossible for the trustees to know of all those who at different stages of the work have rendered valuable assistance.

Special acknowledgment is due to the Carnegie Corporation of New York and to the International Education Board, whose appropriations in the support of this work were a large factor in making its successful completion possible.

It is appropriate to give here special recognition to those who assumed and carried out definite responsibility in the solicitation of funds, as well as to those whose financial support enabled the project to be made a reality.

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The work of the trustees began with the appointment of Hugh K. Moore in 1920, with whom were later associated Julius Stieglitz, representing the American Chemical Society, and E. P. Hyde, representing the American Physical Society. After a substantial sum had been procured, the number was enlarged to include H. E. Howe and later George P. Adamson and Charles L. Reese. Mr. Hyde resigned to go abroad and was succeeded by Frank B. Jewett, who has lately been succeeded by Michael Pupin as representative of the American Physical Society. Upon relinquishing his active duties in the National Research Council, H. E Howe was succeeded as Secretary of the Board of Trustees by W. M. Corse, but remained a member of the Board; and a little later Edward B. Craft was added to the Board.

The trustees have been obliged to place a maximum limit on the cost of this work, but they realize that other material which could not be included because of financial limitations should be made available and that International Critical Tables, if it is to render maximum service, should become an established institution, with supplements and revisions published from time to time, in order that these fundamental data may be made available as rapidly as the values are established through further research. An endowment therefore should be sought for International Critical Tables, and with the appearance of the completed set it is believed the enterprise will appeal to many of those able to make such an endowment a reality.

The trustees wish to express their gratitude to the many industrialists who have given of their time to become acquainted with this enterprise, for the courtesy which they have everywhere met, and for the widespread cooperation without which International Critical Tables could not have been brought into existence.

George P. Adamson
William M Corse
Edward B Craft
Harrison E. Howe
Hugh K. Moore
Michael I. Pupin
Charles L. Reese
Julius Stieglitz

PREFACE BY THE BOARD OF EDITORS

At the organization meeting of the International Union of Pure and Applied Chemistry, held in London in June 1919, the Union approved as one of its projects the compilation of International Critical Tables of Numerical Data of Physics, Chemistry, and Technology, and assigned to the United States of America the financial and editorial responsibility for the undertaking. The project was later given the patronage of the International Research Council at its Brussels meeting in 1923.

On behalf of the National Academy of Sciences, the National Research Council of the United States accepted the executive, editorial and financial responsibilities of the project, and with the cooperation of the American Chemical Society and the American Physical Society, created a Board of Trustees to take charge of the financial and business administration, and a Board of Editors to supervise and carry out the preparation of the text.

The first action of the Board of Editors, early in 1922, was to approve the appointment of Corresponding Editors in different parts of the world, particularly in all those countries in which conditions were such that they might be expected to take a really active part in the undertaking. In making these appointments, the Board first sought the advice of competent individuals in the several countries, and in accordance with the suggestions thus received, appointed ten Corresponding Editors and empowered them to arrange for Advisory Committees to assist in the work. In the case of certain countries, the Board was unsuccessful in its efforts to secure cooperation, usually either because of the receipt of no reply or an unfavorable reply, or through failure of the Corresponding Editor, after appointment, to perform his duties.

The general plan of preparation of the Tables was as follows: The subject matter was first divided into some 300 different sections. The Corresponding Editors were then asked to recommend for the several sections one or more persons who should either have some special knowledge of the subject matter of the section, or be otherwise qualified to pass critical judgment upon the available information on the subject. On the basis of the recommendations thus received, the Board of Editors selected the Cooperating Experts, to whom was intrusted the task of critically compiling, and displaying in suitable form, the available quantitative information upon the several topics. In making these selections, the Board consistently endeavored to secure the best man *available* in the light of all the information which it possessed. In certain special fields composed of closely related topics, the Board provided also for the appointment of Special Editors to supervise the work and to assist in the final arangement of the material.

In the course of its labors the Board of Editors has enjoyed the cooperation of numerous organizations and individuals whose advice, suggestions, and assistance, in many ways have greatly aided it in its complex and difficult task. It is especially indebted to the several Corresponding Editors and their Advisory Committees, who have generously contributed their time and thought to the success of the work; to the Special Editors; to the U. S. Bureau of Standards, the National Physical Laboratory of Great Britain and the Physical Society of France; to the International Commission in charge of Annual Tables; and to various organizations and individuals who made available unpublished data for the use of the Cooperating Experts.

PREFACE PAR LE COMITÉ DES RÉDACTEURS

Lors de l'Assemblée d'organisation de l'Union internationale de Chimie pure et appliquée, qui eut lieu à Londres en Juin 1919, l'Union approuva comme l'un de ses projets l'élaboration de Tables critiques de valeurs numériques de physique, chimie et technologie, et elle chargea les Etats-Unis d'Amérique de la responsabilité financière et d'édition de l'entreprise. Le projet fut, plus tard, placé sous le patronage du Conseil international de Recherches, à son assemblée de Bruxelles en 1923.

Chargé de ces attributions, le Conseil national de Recherches des Etats-Unis, agissant en collaboration avec la Société chimique américaine et la Société physique américaine, nomma un Conseil d'Administration et un Comité des Rédacteurs.

La première activité que manifesta le Comité des Rédacteurs, au début de 1922, fut d'approuver la nomination de Rédacteurs-correspondants dans les différentes parties du monde, particulièrement dans tous les pays dont les conditions autorisaient l'espoir d'une collaboration active dans cette entreprise. Pour procéder à ces nominations, le Comité sollicita d'abord l'avis de personnalités compétentes dans les divers pays, et c'est en tenant compte des suggestions ainsi obtenues qu'il nomma dix Rédacteurs-correspondants et leur donna les pouvoirs nécessaires pour organiser des Comités-consultatifs dans le but d'aider à l'accomplissement du travail. Dans le cas de certains pays, les efforts du Comité en vue de s'assurer leur coopération furent vains, soit qu'il n'y eût pas de réponse ou que celle-ci fut défavorable, soit encore que le Rédacteur-correspondant, après sa nomination, eût manqué à ses engagements.

Le plan général de préparation de ces Tables fut le suivant: l'ensemble des matières à traiter fut d'abord divisé en quelque 300 différentes sections. Les Rédacteurs-correspondants furent alors priés de recommander, pour les différentes sections, une ou plusieurs personnes qui eussent des connaissances spéciales du sujet traité dans la section ou qui fussent qualifiées pour formuler un jugement critique sur les informations à disposition concernant le sujet. Sur la base des recommandations ainsi reçues, le Comité des Rédacteurs choisit les Experts-coopérants qui furent chargés de la compilation critique et de la disposition sous une forme convenable des informations quantitatives disponibles sur les différents sujets. En faisant cette sélection, le Comité s'efforça de s'assurer la collaboration de la personne qui, d'après les renseignments recueillis, était la plus qualifiée et qui se trouvait alors disponible. Dans certains domaines spéciaux, composés de sujets étroitement apparentés, le Comité se chargea aussi de nommer des rédacteurs spéciaux pour diriger le travail et pour aider à l'arrangement final de la matière.

Au cours de ses travaux, le Comité des Rédacteurs a eu le plaisir d'enregistrer la coopération de nombreuses organisations et de particuliers dont lés conseils, les suggestions et l'aide lui ont été, en maintes circonstances, d'un grand secours dans l'accomplissement de sa tâche complexe et difficile. Il est spécialement reconnaissant aux nombreux Rédacteurs-correspondants et à leurs Comités-consultatifs qui ont généreusement donné leur temps et leur pensée pour assurer le succès de l'oeuvre; aux Rédacteurs spéciaux, au U. S. Bureau of Standards, au National Physical Laboratory of Great Britain et à la Société de Physique de France; à la Commission internationale chargée des Tables annuelles; ainsi qu'aux

VORWORT DER REDAKTIONS-KOMMISSION

An der geschäftlichen Sitzung der Internationalen Union für reine und angewandte Chemie in London, Juni 1919 billigte die Union, als eine ihrer Aufgaben, die Abfassung Internationaler kritischer Tafeln, numerischer Daten der Physik, Chemie und Technologie und betraute die Vereinigten Staaten von Amerika sowohl mit dem finanziellen als auch mit dem redaktionellen Teil dieser Aufgabe. Der Plan erhielt spater die Förderung durch International Research Council an der Tagung in Brussel 1923.

Entsprechend dieser Betrauung errichtete National Research Council der Vereinigten Staaten, zusammenwirkend mit American Chemical Society und American Physical Society vorgehend, eine geschäfts-fuhrende Kommission und eine Redaktions-Kommission.

Die ersten Schritte, welche die Redaktions-Kommission zu Beginn des Jahres 1922 machte, war, sich korrespondierende Mitglieder in allen Teilen der Welt zu sichern, besonders in denjenigen in welchen die Bedingungen vorhanden waren, die eine lebhafte Beteiligung an dem Unternehmen erwarten liessen. Nach diesem nahm die Kommission zuerst den Rat massgebender Personlichkeiten verschiedener Länder entgegen; in Übereinstimmung mit den so erhaltenen Vorschlagen, wurden zehn korrespondierende Mitglieder bestimmt, welche nun einen beratenden Ausschuss zu bilden hatten, um der Arbeit ihre Unterstützung zu zuwenden. In einigen Ländern gelang es der Kommission nicht Mitarbeiter zu erlangen, meistens deshalb weil keine, oder eine ablehnende Gegenäusserung erfolgte, oder, dass das korrespondierende Mitglied, nach der entsprechenden Zusage nicht vorging.

Die Grundlinien für die Bearbeitung der Tafeln waren die folgenden. Das Material wurde zuerst in etwa dreihundert verschiedene Abschnitte zerlegt. Die korrespondierenden Mitglieder wurden dann gebeten, für einige dieser Abschnitte, einen oder mehrere Mitarbeiter zu empfehlen, die entweder besondere Kenntnisse uber den Gegenstand des Abschnittes besitzen, oder imstande waren, kritisch, vorhandenes Material durchzugehen. Auf Grund der so erhaltenen Empfehlungen, wahlte die Redaktionskommission die Mitarbeiter aus, die mit der Aufgabe betraut wurden, kritisch die numerischen Daten des betreffenden Gegenstandes durchzuarbeiten und in entsprechender Form darzustellen Bei dieser Auswahl war die Kommission ganz besonders bestrebt, nach den vorhandenen Mitteilungen, den besten *zur Verfügung* stehenden Mitarbeiter zu erhalten. In gewissen nahe verwandten Gebieten war man darauf bedacht, besondere Redaktions-mitglieder zu erhalten, um die Arbeit hier zu überwachen und tätigen Anteil der Schlussredaktion des Materials zu nehmen.

Im Laufe ihrer Bestrebungen konnte sich die Redaktion-Kommission der Mitarbeit zahlreicher Vereinigungen und einzelner Personen erfreuen, deren Ratschläge, Winke and Beihilfe ihnen bei der verwickelten und schweren Aufgabe von grossem Nutzen waren. Die Redaktionskommission ist besondren Dank ihren verschiedenen korrespondierenden Mitgliedern und dem beratendem Ausschuss schuldig, die in grossmütiger Weise ihre Zeit und Arbeit dem Erfolg dieser Tafeln gewidmet haben, ferner auch den Mitgliedern, die die Arbeit an den besonderen Kapiteln überwachten. Der Dank gebührt U. S. Bureau of Standards, National Physical Laboratory of Great Britain und Société de Physique de France, der Internationalen Kommission betraut mit der Herausgabe der Tables annuelles und den verschiedenen Ver-

PREFAZIONE DELL' UFFICIO DI REDAZIONE

Nella conferenza tenuta a Londra nel giugno 1919 per organizzare la Unione Internazionale della Chimica Pura ed Applicata venne, tra gli altri, formulato il progetto di compilare delle Tabelle Critiche Internazionali contenenti dati numerici di fisica, chimica e tecnologia, e venne affidata agli Stati Uniti la responsabilità finanziaria ed editoriale dell'impresa. Al progetto fu in seguito accordato il patronato del Consiglio Internazionale di Ricerche nella riunione del 1923 a Bruxelles.

In seguito all'incarico ricevuto, il Consiglio Nazionale di Ricerche degli Stati Uniti, d'accordo con la American Chemical Society e con la American Physical Society, nominò un Consiglio di Amministrazione ed un Ufficio Editoriale.

Come suo primo atto, l'Ufficio, nel 1922, nominò Redattori Corrispondenti in tutto il mondo, scegliendoli di preferenza nei Paesi dove poteva ritenersi che essi avrebbero preso parte attiva al lavoro. Le nomine furono fatte dopo aver sentito il parere di persone competenti A questo modo furono scelti dieci Redattori Corrispondenti e ad essi venne data facoltà di nominare ciascuno un Comitato consultivo col compito di assisterli nel lavoro. In alcuni Paesi l'Ufficio non riuscì ad assicurarsi collaborazione di sorta, o perchè addirittura non gli fu possibile ottenere una risposta, o perchè la risposta fu negativa, o perchè il Redattore Corrispondente scelto, dopo essere stato nominato, mancò agli obblighi assunti.

Il piano generale di preparazione delle tabelle è stato il seguente. Si è divisa la materia in circa 300 capitoli differenti, e i Redattori Corrispondenti sono stati invitati a suggerire per ogni singolo capitolo il nome di una o più persone le quali o avessero una speciale competenza nell'argomento o potessero ritenersi capaci di vagliare criticamente tutto quello che si conosce al riguardo. In base alle proposte ricevute, l'Ufficio di Redazione scelse gli Esperti, e a questi affidò l'incarico di raccogliere, vagliare ed esporre in forma opportuna i dati quantitativi che si sono potuti riunire sui diversi argomenti.

Nel fare la scelta degli Esperti l'Ufficio cercò sempre di assicurarsi la collaborazione degli uomini che, in base alle informazioni avute, dovevano ritenersi i migliori di cui si potesse disporre. In certi campi speciali, comprendenti argomenti strettamente connessi, l'Ufficio nominò anche dei Redattori Speciali col compito di sorvegliare il lavoro e collaborare alla disposizione definitiva del materiale.

Nell'espletare il suo compito, l'Ufficio di Redazione ha potuto giovarsi della collaborazione di numerouse organizzazioni e di numerose persone, le quali con consigli e suggerimenti vari sono state di grande aiuto nel portare a fine un lavoro che è stato certamente complesso e difficile. L'Ufficio è specialmente grato ai vari Redattori Corrispondenti e ai rispettivi Comitati Consultivi i quali hanno generosamente dato il loro tempo e la loro intelligenza al successo dell'opera, ai Redattori Speciali, al Bureau of Standards degli Stati Uniti, al National Physical Laboratory inglese e alla Société de Physique francese, alla Commissione Internazionale in carica per le Tabelle annuali e alle varie organizzazioni e persone che misero a disposizione degli Esperti dati inediti.

Infine i Membri dell'Ufficio desiderano manifestare l'alto apprezzamento che fanno dei contributi di tutti gli Esperti, il lavoro dei quali, compiuto in larga misura con entusiasmo e disinteressatamente, ha reso possibile queste tabella; ed in particolar modo

Finally, the members of the Board desire to record their appreciation of the work of all of the Cooperating Experts whose contributions, largely a labor of love, have made these tables possible; and in particular, of the work of the Editorial Staff, Messrs. Washburn, Dorsey, and West, to whom indeed the utility of this collection of tables should be largely accredited.

George K Burgess
Saul Dushman
John Johnston

S. C. Lind
C. E. Mendenhall
R. B. Moore.

organisations diverses et aux personnes qui ont procuré des données inédites à l'usage des Experts-coopérants.

Efin, les membres du Comité désirent exprimer leur appréciation pour le travail de tous les Experts-coopérants dont les contributions, pour une large part désintéressées, ont rendu possible l'élaboration de ces Tables, et en particulier pour le travail des Rédacteurs, MM. Washburn, Dorsey et West, auxquels nous sommes en grande partie redevables des services que rendra cette collection de Tables.

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INTRODUCTION

International Critical Tables is the result of the cooperative labors of a large number of specialists, each of whom has been charged with the responsibility for the critical compilation of the quantitative information available on his topic. The word "critical" in this connection means that the Cooperating Expert was requested to give in each instance the "best" value which he could derive from all the information available, together, where possible, with an indication of its probable reliability.

Through a cooperative arrangement with International Annual Tables, the Board of Editors has been able to place in the hands of each Cooperating Expert the literature references belonging to his topic for the years 1910–1923 inclusive, as compiled by the staff of International Annual Tables. For the period preceding 1910, each Cooperating Expert was directed to collect the necessary literature references from the various published handbooks, special treatises, works of reference, and other sources known to him as a specialist in the field. No attempt has been made to systematically cover the literature since 1923, although a certain amount of information published since then has been utilized.

In preparing the various sections, the Cooperating Experts were instructed,

1. To include in the bibliography only (*a*) the sources of the data upon which their reported values actually rest, and (*b*) the sources of available data of the same kind pertaining to those systems for which no numerical value is given. It is not intended to be a complete bibliography of the field.
2. To omit from the tables of numerical data all those systems for which the available data (*a*) were of slight scientific or practical interest, or (*b*) were so discordant as to be of little, if any, value.
3. To set forth the results of their work in the form of text, equations, tables, graphs, or charts, as seemed most appropriate under the circumstances, having regard to the necessity of space economy.
4. To give only selected samples illustrating types in the case of very large and heterogeneous fields, such as colloids, chemical kinetics, and certain classes of industrial materials
5. To restrict the accompanying explanatory text to the amount necessary for the intelligent use of the data. (Under this restriction, the Expert is given no opportunity to present a general discussion of his subject or of the methods by which he obtained the values given.)

In preparing the textual material for publication the Editors have been compelled, in the interest of economy of space, to enforce the restrictions imposed by sections 3 and 5 of the preceding paragraph and have freely rearranged and rewritten the text, whenever it was evident that a compression or an improvement in logical order could be so secured. With few exceptions, which are duly

INTRODUCTION

Les Tables critiques internationales sont le résultat du travail coopératif d'un grand nombre de spécialistes, chacun de ceux-ci ayant été chargé de la responsabilité de la compilation critique des informations disponibles sur son sujet. Le mot "critique" dans ce cas signifie que l'expert coopérant fut invité à donner dans chaque circonstance la "meilleure" valeur qu'il pouvait recueillir de toutes les informations disponibles, en ajoutant si possible une indication au sujet de la confiance probable qu'on pouvait avoir en elle.

Par le fait d'un arrangement coopératif avec les Tables annuelles internationales, le Comité des Rédacteurs a été en mesure de mettre à la disposition de chaque expert coopérant les références bibliographiques appartenant à son sujet de l'année 1910 à l'année 1923 inclusivement, celles-ci ayant été compilées par le Bureau des Tables annuelles internationales. Pour la période précédant 1910, chaque expert coopérant fut chargé de recueillir les références bibliographiques nécessaires en usant des manuels variés publiés, des traités spéciaux, des ouvrages de références, et d'autres sources connues de lui en sa qualité de spécialiste du sujet traité. En ce qui concerne la littérature depuis 1923, aucune tentative n'a été faite pour la couvrir d'une façon systématique; un certain nombre d'informations postérieures à 1923 ont cependant été utilisées.

Pour la préparation des différentes sections, il fut recommandé aux experts coopérants:

1. D'inclure dans la bibliographie seulement (*a*) les sources de valeurs sur lesquelles reposent actuellement leurs valeurs reportées, et (*b*) les sources des données de même nature appartenant aux systèmes pour lesquels aucune valeur numérique n'est donnée. Le but poursuivi n'est pas de constituer une bibliographie complète du sujet.
2. De ne pas introduire dans les tables de valeurs numériques tous les systèmes pour lesquels les valeurs disponibles (*a*) sont de peu d'intérêt scientifique ou pratique, ou (*b*) sont par trop discordantes pour être d'une valeur quelconque, si toutefois elles en présentent une.
3. De disposer les résultats de leur travail sous la forme d'un texte, d'équations, de tables, de graphiques ou de cartes, en employant le moyen qui leur parut le mieux approprié suivant les circonstances, en ayant en vue la nécessité d'économiser de la place.
4. De ne donner que des exemples choisis, illustrant les types, dans le cas d'un champ très vaste et hétérogène, tel que: les colloides, la cinétique chimique et certaines classes de matières industrielles.
5. De restreindre le texte explicatif accompagnant les données au strict nécessarie pour la compréhension de celles-ci. (Vu cette restriction, l'expert n'a donc pas l'occasion de présenter une discussion générale de son sujet et des méthodes par lesquelles il a obtenu les valeurs données).

einigungen und Freunden, die noch nicht veroffentlichten Daten den Mitarbeiteren zur Verfügung stellten.

Schliesslich möchte die Redaktions-Kommission ihre Anerkennung den Mitarbeiteren ausdrücken, deren Arbeitsfreudigkeit diese Tafeln möglich machten, im besondrem aber auch der Muhewaltung des Redaktionsstabes der Herrn Washburn, Dorsey und West, denen man vorwiegend den Erfolg und die Nutzlichkeit dieses Tabellenwerkes schulden muss.

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ricordano l'opera dei dirigenti dell'Ufficio di Redazione, Sigg. Washburn, Dorsey, e West ai quali sopratutto si deve essere grati per l'utilità che si avrà dalla presente raccolta di tabelle.

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EINLEITUNG

Die Internationalen kristischen Tafeln stellen die Ergebnisse des Zusammenwirkens einer grossen Zahl von Mitarbeiteren mit besonderen Erfahrungen dar, die mit der Aufgabe betraut wurden, die erreichbaren Daten des entsprechenden Gebietes kritisch darzustellen. In dieser Verbindung bedeutet das Wort kritisch soviel, dass der Mitarbeiter gebeten wurde, in jedem einzelnem Fall die "besten" Werte zu geben, die er auf Grund aller zur Verfugung stehenden Literaturstellen, ableiten konnte, zugleich ferner, wenn möglich, alle Angaben mit dem Grade ihrer Zuverlasslichkeit zu vermerken.

Durch ein Übereinkommen mit der Redaktion der Tables annuelles konnte die Redaktionskommission jedem einzelnem Mitarbeiter, über seinen Gegenstand die Literatur der Jahre 1910 bis einschliesslich 1923 soweit ubergeben, als sie durch die Redaktion der Tables annuelles ausgearbeitet worden ist. Fur die Zeit vor '1910 wurde ein jeder Mitarbeiter gebeten, die notwendigen Literaturstellen und Daten aus den verschieden vorhandenen Handbüchern Spezial-und Nachschlagewerken und anderen, ihm als besonderem Kenner auf diesem Gebiete erreichbaren Quellen, zu sammeln. Es ist nicht versucht worden, die Literatur seit 1923 noch systematisch darzustellen, obwohl ein gewisser Teil davon noch Berücksichtigung finden konnte.

Bei der Bearbeitung der verschiedenen Abschnitte erhielt der Mitarbeiter folgende Anweisungen:

1. Als Literatur sind (*a*) nur diejenigen Stellen anzugeben, auf Grund deren die angegebenen Werte besonders folgerten, (*b*) die Quellen, über denselben Gegenstand, die aber keine numerischen Daten enthalten, die Verwendung gefunden haben.
2. Es sind in den Zahlenangaben der Tafeln alle diejenigen Systeme wegzulassen, deren vorliegende Daten, (*a*) von geringem wissenschaftlichen und praktischen Werte sind, order (*b*) die Daten sind so wiedersprechend, dass sie, wenn uberhaupt, von geringem Werte sind.
3. Die Ergebnisse ihrer Arbeit sind in einer solchen Form darzustellen, dass durch den Text, die Gleichungen, Tabellen und Tafeln mit Rücksichtnahme auf Raumersparnis, der Zweck am besten erfüllt wird.
4. In sehr grossen, heterogenen Gebieten wie in denen der Kolloide, der chemischen Kinetik und in gewissen Fallen von technischer Bedeutung, sind nur ausgewahlte Beispiele zu geben, die das Gebeit charakterisieren sollen.
5. Der erläuternde Text ist soweit zu beschränken, dass eine sachgemässe Verwertung der Tafeln noch möglich ist. (Bei dieser Einschränkung hat der Experte nicht die Gelegenheit allgemein seine Aufgabe, noch die Methode, darzustellen, nach welchen er seine Angaben erhalten hat.)

INTRODUZIONE

Le Tabelle Critiche internazionali sono il frutto della collaborazione di un gran numero di specialisti a ciascuno dei quali è stato affidato il compito di vagliare i dati disponibili sopra un determinato soggetto. La denominazione di tabelle "critiche" indica che l'esperto è stato incaricato di dare in ogni caso il valore "migliore," deducibile da tutte le notizie che si hanno a disposizione. Tutte le volte che è stato possibile l'esperto è stato incaricato anche di dare indicazioni sul grado di attendibilità dei valori numerici.

In seguito ad accordi intervenuti con le Tabelle annuali internazionali, l'ufficio di Redazione ha potuto fornire a ciascun esperto le indicazioni bibliografiche riferentisi agli anni dal 1910 al 1923 incluso, quali vengono compilate dalla direzione delle Tabelle internazionali. Per gli anni precedenti al 1910, gli esperti vennero consigliati a raccogliere la letteratura dai vari manuali, trattati speciali, lavori bibliografici e da altre fonti ad essi note data la qualità di ognuno di specialista in un determinato campo. Dei dati pubblicati dopo il 1923 si è tenuto conto solo in parte.

E' stato raccomandato agli esperti che, nel preparare le varie parti:

1. Includessero nella Bibliografia soltanto: (*a*) le fonti delle indicazioni sulle quali sono basati i valori riportati, e (*b*) le fonti delle indicazioni riguardanti i sistemi per i quali non viene dato nessun valore. Non si è riportare inteso una bibliografia completa del soggetto.
2. Omettessero nelle tabelle delle grandezze numeriche tutti quei sistemi per i quali i dati disponibili; (*a*) fossero di poco interesse scientifico o pratico, oppure (*b*) fossero così in disaccordo da essere di poco o di nessum valore.
3. Esponessero, a seconda dei casi, i risultati del loro lavoro in forma di testo, di equazioni, di tabelle, di grafici, o di tavole tenendo presente la necessità di economia di spazio.
4. Riportassero soltanto esempi tipici nei campi molto vasti ed eterogenei come colloidi, cinetica chimica ed alcune classi di prodotti industriali.
5. Limitassero il testo esplicativo a quel tanto sufficiente per un uso intelligente delle tabelle (data questa limitazione, all' esperto non è stato consentito di redigere una esposizione generale del suo soggetto o dei metodi con i quali egli ha ottenuto i valori che riporta).

Nel preparare il testo per la pubblicazione i Redattori sono stati obbligati, per economia di spazio, ad applicare le restrizioni imposte nei capoversi 3 e 5 del precedente paragrafo, ed hanno liberamente cambiato disposizione e forma al testo, ogni qualvolta era evidente che potesse derivarne un miglioramento. Salvo poche eccezioni, tutte indicate la forma definitiva del testo è stata sottoposta alla approvazione dell'Esperto.

noted, the final form of the rewritten text was submitted to the Expert and was accepted by him.

In preparing the numerical data for publication the Editors have made no change except in their arrangement and in their mode of presentation. In making such changes the Editors have been guided by the necessity of saving space. The numerical data are in all cases those submitted by the Expert, excepting that (*a*) a few additional values, all duly indicated, have been inserted, and (*b*) when an Expert has submitted a number of values for the same nominal quantity, these have been grouped so as to make a single entry with an indication of the range covered by the values submitted, whenever such grouping seemed justifiable. In these cases, the final manner of grouping was in every case where possible submitted to and accepted by the Expert. The exceptional cases are noted as they occur.

Owing to the method of publication, *i e*, one volume at a time, a strictly logical arrangement of subject matter is not always followed. Among such a large number of Cooperating Experts a few instances of greatly delayed reports, arising from illness, accident, or other unforeseen causes, are to be expected; and certain sections or parts of sections, therefore, may not appear in their logical places but will be found in a later volume. The whole set of volumes is very completely indexed, however, and the user who consults the index should have no difficulty in locating any information given.

Chemical compounds are arranged in the tables by formula according to a definite system, called the "Standard Arrangement." This system is based upon a set of key numbers for the chemical elements and is fully explained in Volume One.

In order to find a given substance in the longer tables it is therefore necessary to know its chemical formula, at least approximately. If only the name is known, the formula, for most organic compounds or minerals, may be found with the aid of the name indices in Volume One, p. 174 and 280.

Pour la préparation du texte destiné à la publication, les rédacteurs se sont vu obligés, afin d'économiser encore de la place, d'accentuer encore les restrictions imposées dans les sections 3 et 5 du paragraphe précédent et ils ont pris la liberté de ré-arranger et de ré-écrire le texte partout où il était évident qu'une compression ou une amélioration dans l'ordre logique pouvait ainsi être réalisée. A part de rares exceptions, qui sont du reste dûment notées, la forme définitive du texte ré-ècrit fut soumise à l'expert et acceptée par lui.

En disposant les données numériques pour la publication, les rédacteurs n'ont fait aucune modification, excepté en ce qui concerne l'arrangement et le mode de présentation. En faisant ces changements, les rédacteurs ont été guidés par la nécessité d'épargner de la place.

Les données numériques sont dans tous les cas celles fournies par les experts, à l'exception (*a*) d'un petit nombre de valeurs, toutes dûment indiquées, qui ont été insérées, et (*b*) lorsqu'un expert à soumis un certain nombre de valeurs pour la même quantité nominale, ces valeurs ont été groupées de façon à constituer une entrée unique, avec une indication du range occupé par les valeurs fournies, toutes les fois qu'un tel groupement paraissait indiqué. Dans ces cas, la forme définitive du groupement fut, partout où cela était possible, soumise a l'expert et acceptée par lui. Les cas exceptionnels sont notés lorsqu'ils se présentent.

Etant donné le mode de publication par un volume à la fois, un arrangement strictement logique de la matière traitée n'est pas toujours possible. En effet, avec un tel nombre d'experts coopérants, il faut s'attendre à ce qu'il y ait quelques circonstances imprévues, telles que maladies, accidents ou autres causes, occasionnat un grand retard dans la remise des rapports; c'est pourquoi certaines sections ou parties de sections ne peuvent paraître à leur place logique mais se trouveront dans un volume suivant. Cependant, la série complète des volumes étant indexée d'une façon très détaillée, le lecteur qui consulte la table des matières n'aura aucune difficulté pour repérer toute information donnée.

Les composés chimiques sont disposés dans les tables suivant leurs formules et cela d'après un système défini appelé "arrangement type." Ce système est basé sur une suite de "nombres clés" pour les éléments chimiques, et il est expliqué d'une façon complète dans le volume I.

Afin de trouver une substance donnée dans les longues tables, il est nécessaire de connaître sa formule chimique au moins approximativement. Si le nom seul est connu, la formule peut être trouvée pour la plupart des composés organiques ou des minéraux au moyen des noms indices qui se trouvent dans le volume I, p. 174 et 280.

Bei der Zusammenstellung des Textes für die Veröffentlichung waren die Herausgeber gezwungen, im Interesse der Raumersparnis die unter 3 und 5 oben angegebenen Richtlinein besonders zu betonen. Sobald erkannt wurde, dass eine Zusammenziehung und eine Verbesserung in der logische Anordnung moglich sei, wurde der Text frei zusammengestellt und frisch geschrieben. Mit wenigen Ausnahmen, welche besonders bezeichnet sind, wurde die entgültige Form des neu geschriebenen Textes dem Experten vorgelegt und von ihm angenommen.

Bei der Vorbereitung des Zahlenmaterials fur die Veroffentlichung änderten die Herausgeber nichts, ausgenommen war nur dessen Anordnung und die Form der Darstellung, wobei man sich von der Notwendigkeit, Raum zu sparen, leiten liess. Die Zahlenwerte sind in allen Fällen dieselben, welche vom Experten vorlagen, ausgenommen, (*a*) dass einige erganzende, besonders bezeichnete Werte hinzugefügt wurden und (*b*), wenn der Experte für dieselbe quantitative Grösse mehrere Werte angegeben hat. Diese wurden dann, sobald ein solches Vorgehen gerechtfertigt war, zusammengestellt, so, dass nur eine Zahl, mit den Grenzen hingeschrieben werden konnte, welche durch die Werte gegeben sind. In so einem Falle wurde die Endform der Anordnung jedesmal dem Experten, wo moglich vorgelegt und von ihm angenommen. Die Ausnahmsfalle sind dorten wo sie vorgekommen bezeichnet.

Entsprechend der Publikationsmethode, der Herausgabe eines Bandes zu einer bestimmten möglichen Zeit, konnte eine genaue logische Anordnung eines bestimmten Kapitels nicht immer erreicht werden. Unter einer so grossen Zahl von Mitarbeiteren sind Fälle zu erwarten, wo sich einige Artikel stark verzögern werden, sei es durch Krankheit oder andere unvorhergesehene Ursachen. Deshalb werden gewisse Abschnitte oder deren Teile nicht an ihren richtigen Plätzen erscheinen, sonderen sie können in einem späteren Band gefunden werden. Die ganze Bänderfolge ist mit einem sehr vollständigem Verzeichnis versehen und der Leser, welcher das Verzeichnis benützt, wird keine Schwierigkeit haben, Vorhandenes aufzufinden.

Die chemischen Verbindungen sind in den Tafeln nach einem Formelsystem angeordnet, das als "Normalanordnung" (Standard Arrangement) bezeichnet wird. Dieses System, das im ersten Bande vollständig erklärt wird, beruht darauf, dass fur die chemischen Elemente Schlüsselnummern gewählt werden.

Um im den längeren Tafeln eine gegebene Substanz aufzufinden, ist es notwendig, deren chemische Formel wenigstens annähernd zu kennen. Ist nur der Name bekannt, so kann die Formel der meisten organischen Verbindungen und der Minerale, mit Hilfe des englischen Namenverzeichnisses im Bande 1 Seite 174 und 280 gefunden werden.

Nell'allestire i dati numerici per la pubblicazione i Redattori hanno fatto cambiamenti solo nel modo di disporli e di presentarli. Nel fare questi cambiamenti i Redattori sono stati guidati dalla necessità di risparmiare spazio. I dati numerici sono in tutti i casi quelli forniti dall'Esperto; solo qualche volta sono stati aggiunti alcuni pochi valori, tutti bene indicati, e qualche altra, avendo l'Esperto riportato parecchi valori per una stessa grandezza, questi—allorchè è sembrato giustificato il farlo—sono stati raggruppati indicando un solo numero ed i limiti entro i quali oscillano i valori considerati. In questi casi, la disposizione finale fu sempre, quando possibile, sottoposta all'approvazione dell' Esperto. Tutte le volte che è stato fatto diversamente, lo si è indicato.

Siccome le tabelle vengono pubblicate un volume alla volta, non sempre la disposizione della materia è fatta in modo strettamente logico

Dato il numero grande di Esperti, è da aspettarsi che qualche rapporto sarà presentato con grande ritardo a causa di malattie o di incidenti imprevedibili. Certe parti periciò potranno comparire non nel posto che logicamente ad esse spetterebbe, ma in volumi posteriori. Tutti i volumi sono però muniti di indici accurati e il lettore, consultandoli, non avrà difficoltà a rintracciare una notizia qualunque.

I composti chimici sono disposti nelle tabelle in base alle formule seguendo un sistema chiamato "disposizione Standard." Questo sistema è fondato sopra una serie di numeri chiave assegnati agli elementi chimici ed è esaurientemente spiegato nel primo volume.

Per poter quindi trovare una data sostanza nelle tabelle più lunghe, è necessario conoscerne la formula chimica, almeno approssimativamente. Se si conosce solo il nome, la formula si può trovare (per la massima parte dei composti organici o minerali) con l'aiuto degli indici per nome contenuti nel 1° volume p. 174 e 280.

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xviii & xix	Ready Reference Tables. *Between* (c) and (d) *insert* Boiling points (inorganic) .. 162 *To* (d) entry *add* 165, 276 *Between* (d) and (e) *insert* Index to minerals 174, Index to ℭ-Table 280
4	Column 4. *For* Columbia *read* Colombia
7	Column 3, under Mass *For* 453 592 45 *read* 453 592 43 *For* 64 798 182 *read* 64 798 918₂
8	Column 1, 1 bushel *For* 35 367 7048 l *read* 36 367 7048 l
10	Column 1 *For* 1 mal = 10 a *read* 1 mål or maal = 9 843 or 10 a
12	Column 2 *For* 1 aln *read* 1 aln 1 famn 1 famn 1 stang = 16 1 stång = 10 or 16
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13	Column 1, 1 saah *For* $\frac{1}{10}$ *read* $\frac{1}{12}$
17	Column 1, (v) *For* p 27 *read* p 38
	Accepted Basic Constants Regarding Uncertainty column *add* These values are rough estimates and those for **e**, **e** $\mathbf{m_0}$ and **h** should probably be several times as great as the values given
18	Section A. These Derived Constants have been computed from the Accepted Basic Constants on p 17, and are vitiated by the errors in those values The greatest errors occur in ν_∞ and N_∞, which differ from the best experimental values by about 0 4 %, the computed value of ν_ω being too small *For* v_ω *read* ν_ω
	Section B, $\log_{10} \lambda$ *For* 4 808 7827 *read* 3 808 7827
23	Table 28, last line *For* 15 5951 *read* 13 5951. *For* 1 192 9882 *read* 1 133 3824.
26	Table 48. *For* 1 0000 lambert 0.000 0000 1.0764 millilambert 0 031 9684 *read* 3 1416 lambert 0 497 1499 3 3816 millilambert 0 529 1183
34	Column 2, line 1 *For* 980 655 *read* 980 665
42	Column 1 *For* Synonical *read* Synodical
49	Column 1 *For* X *read* Xe
52	*For* F O Fairchild *read* C O Fairchild
62	Column 2. *For* above 20° *read* below 20°
66	Section (*a*), Phosphorus pentasulfide *For* 52° *read* 522°
91	High Vacuum Technique line 1, for *Amount* read *Mass* line 6, *after* molecules *add* striking 1 cm² sec⁻¹ line 11, *for* *Q* = amount *read* *Q* = volume
102	The Gaseous State, viscosity column A, *for* 221 *read* 222 Br, *for* 155 *read* 154. Air, *for* 284 2 *read* 180 8
106	Line 1. *For* Smithers *read* Smither. Line 3 *For* John C W Frazer *read* J C W Frazer Index No 6 *For* −76 *read* −59 Index No 35 1 *Delete* l in density column for 3 182$^{?}_{?}$
109	Index No 204, d_4^{20} *Add* 3 022 Index No 205, d_4^{10}. *Add* 4 49 Index No 206, d_4^{20}. *Add* 3 63.
110	Index No 259. Delete entry.
115	Index No. 500 *For* Attaite *read* Altaite
119	Index No. 766. Delte entry. Index No. 767 *For* 45 5 *read* 44 07.
122	Index No. 940 *Add* Eriochalcite. Index No. 1001. *For* Phosphochalite *read* Phosphochalcite
128	Index No. 1354. *For* Szomolnokite *read* Szomolnikite. Index No. 1355 *For* Siderotilate *read* Siderotilite.
129	Index No. 1394. *For* $FeCO_3.H_2O$ *read* $FeCO_3$. *For* 133 855 *read* 115 84.
131	Index No 1507. *For* 2 818$^{22}_{22}$ *read* 4 13
133	Index No. 1631. *For* Crocoitite *read* Crocoite.
134	Index No. 1683. *Insert* Tungstenite. Index No. 1726. *For* $UO_3.CO_2$ *read* $UO_2\ CO_3$.
136	Index No 1819. *For* BN_2 *read* BN. *For* 38 8360 *read* 24 8280
139	Index No 1990. *Insert* Monazite.
143	Index No. 2236. *For* Hydrophyllite *read* Hydrophilite
149	Index No 2622. *For* d 29 6 *read* 29 88
152	Index No. 2807. Probably a decahydrate, *v.* Conroy, *54*, **17**: 104; 98
153	Index No. 2877. *For* 3.55 *read* 2.55.
155	Index No 2968. *For* 96 *read* 256 d. Index No 2994 *For* $KC_{18}H_{35}O_2$ *read* $KC_{18}H_{33}O_2$.
165	Serial No 1 *For* 1 833 *read* 1 1833
174	Column 1 *For* Apiohnite *read* Apjohnite. *Delete* Arsenic siderite
	Column 2, Automolite. *For* 1119 *read* 1911.
	Column 3 *For* Cerargytite *read* Cerargyrite
	Column 4. *For* Chrysotite *read* Chrysotile. *For* Cotlunite *read* Cotunnite
	Column 5 *For* Durfeidtite *read* Durfeldtite
	Column 6. *For* Eriochalite *read* Eriochalcite. *For* Gano-hyllite *read* Ganophyllite.
175	Column 1. *For* Georomite *read* Georonite *For* Jeremejerite *read* Jeremejevite.
	Column 3 *For* Molybdophullite *read* Molybdophyllite *After* Molysite *insert* Monazite, 1990
	Column 4 *For* Phosphochalite *read* Phosphochalcite Polianite *For* (Pyrosulite) *read* (Pyrolusite)
	Column 5, Scheelite *For* 2366 1 *read* 2366. *After* Spencerite *insert* Sperrylite, 1179
175	Column 5 *For* Szomolnokite *read* Szomolnikite *For* Tennanite *read* Tennantite
	Column 6. *After* Tsumebite *insert* Tungstenite, 1683. *For* Uru dggite *read* Urvolgyite
176	Index No 20 *Delete* 2 53.
179	Index No. 232 *Delete* 1 7
180	Index No 263 *For* 1 617 *read* 0 6606
183	Index No 435 *For* $NH(COCH_3)_2$ *read* $NH_2CONHCOCH_3$.
187	Index No 686. *For* −18 *read* −5
188	Index No 725. *For* $CH_3COC_2H_5$ *read* $CH_3CO_2C_2H_5$. Index No 773 1 *For* Methy *read* Methyl
192	Index No 1012 *For* $C_5H_{11}CO_2H$ *read* $C_4H_9CO_2H$
193	Index No 1074 *For* Dimethy *read* Dimethyl
200	Index Nos 1466, 1468, and 1470. Data probably not for pure compounds *o*-Dihydrobenzene and 1, 3-cyclohexadiene are two names for the same compound.
211	Index No 2328. Delete entry. Index No. 2330 *For* −126 4 *read* −126 3 100 8 100 3 0 764 0 7804$^{?}$
220	Index Nos 2719, 2720, and 2721. *For* Cresyl *read* Tolyl
224	Index No 2942 *For* 2-Ethylhexane $CH_3(C_2H_5)CHC_4H_9$ *read* 3-Ethylhexane $(C_2H_5)_2CHC_3H_7$. Index No 2942 1 Delete entry.
227	Index No 3123 *For* $C_9H_{10}O_3$ *read* $C_9H_{10}N_2O_3$ Index Nos 3150, 3151, and 3152 *For* Cresyl *read* Tolyl
234	Index No 3576 *For* $C_6H_5CH\ CHC_2H_5$ *read* $C_6H_5CH_2C{:}CCH_3$.
235	Index No 3635 *For* Benzacetin *read* 5-Acetylamino-2-methoxybenzene-1-carboxylic acid
238	Index No 3848 *For* $C_{10}H_{16}O$ *read* $(C_{10}H_{16}O)_3$ 152 12 456 36 295 310
	Index No. 3862. *For* $[C_{10}H_{16}O]_x$ *read* $(C_{10}H_{16}O)_3$ $[152.12]_x$ 456 36 264 285
242	Index No. 4078 *Add* 5-Acetylamino-2-ethoxybenzene-1-carboxylic acid
247	Index No 4394. 1 525 is the density for the monohydrate
253	Index No 4734. *For* Cresyl *read* Tolyl. *For* *p*-$CH_3C_6H_5O_2CC_6H_4$ *read* *p*-$CH_3C_6H_4O_2CC_6H_5$ Index Nos 4736, 4741, 4742, and 4744 *For* Cresyl *read* Tolyl .
254	Index Nos 4778, 4779, and 4780 *For* Cresyl *read* Tolyl.
258	Index No. 5057. *For* $C_{16}H_{11}N_2$ *read* $C_6H_{13}N_3$. *For* 233.12 *read* 127 124
260	Index No 5152. *For* capronate *read* caproate.
262	Index No. 5291 *For* Chinosol *read* Quinosol
266	Index Nos. 5547, 5550 *For* Jelsemine *read* Gelsemine.
268	Index No. 5653. *For* Strychine *read* Strychnine.
269	Index No 5711. *For* Gelsemine *read* Gelseminine.
270	Index No. 5779. *For* *o*-Cresol *read* *o*-Tritolyl.
271	Index No. 5902. Delete entry
272	Index No. 5928. *For* $C_{27}H_{32}O_{16}$ *read* $C_{27}H_{30}O_{16}$. 612 25 610 23 183 190 Index No. 5967. *For* Octocosane *read* Octacosane.
274	Index No. 6054. *For* capronate *read* caproate. Index No 6082. *For* Filixic *read* Filicic. Index No. 6096. Delete entry
275	Index No 6110 *For* caprinate *read* caprate.
278	Serial No 910. Delete entry.
280	Column 3 *After* *p*-Acetylaminobenzoic acid *insert* 5-Acetylamino-2-ethoxybenzene-1-carboxylic acid, 4078. Column 4 *After* *o*-Acetylaminomethoxybenzene *insert* 5-Acetylamino-2-methoxybenzene-1-carboxylic acid, 3635.
282	Column 4, Benzacetin *Delete* 3635.
285	Column 1. *For* Cerebrin, 5931, 6153 *read* Cerberin, 5931 Cerebrin, 6153

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286 Column 3. Delete 14 entries, beginning with *o*-Cresyl acetate 3150 and ending with *p*-Cresyl salicylate, 4743 Delete *o*-Cresol orthoacetate, 5779
Column 4. *After* *m*-Cymene *insert* *p*-Cymene, 3728.1
290 Column 4, Ergosterol *Delete* 5902
291 Column 3 *Delete* 2 Ethylhexane, 2942
3-Ethylhexane *For* 2942.1 *read* 2942
Ethyl hippurate *For* 4516 *read* 4077.1
292 Column 2, Filicic acid *For* 6096 *read* 6082
Filixic acid Delete entry
Column 3. *For* Gelsemine, 5711 *read* Gelsemine, 5547
Gelseminine, 5711
295 Column 4, Jelsemine, 5547 and Jelsemine hydrochloride, 5550 Delete entries
300 Column 4, *N*-Phenylthiourethane *For* 321 *read* 3201
301 Column 4, Pyrene. *For* 5206 *read* 5026
302 Column 2 *After* Quinoneoxime *insert* Quinosol, 5291
303 Column 1, Terephthalic acid Delete entry.
304 Column 2. *After* Toluylene-3, 5-diamine *insert*
o-Tolyl acetate, 3150
m-Tolyl acetate, 3151
p-Tolyl acetate, 3152
After *p*-Tolylantipyrene *insert*
m-Tolyl benzoate, 4736
p-Tolyl benzoate, 4734
After *p*-Tolyldimethylpyrazolone *insert*
o-Tolyl ether, 4778
m-Tolyl ether, 4779
p-Tolyl ether, 4780
After *p*-Tolyl isothiocyanate *insert*
o-Tolyl methyl ether, 2719
m-Tolyl methyl ether, 2720
p-Tolyl methyl ether, 2721
After *p*-Tolyl mustard oil *insert*
o-Tolyl salicylate, 4741
m-Tolyl salicylate, 4742
p-Tolyl salicylate, 4743
305 Column 3. *After* Trithioglycerol *insert* *o*-Tritolyl orthoacetate, 5779.
306 Column 2, Xanthine. Delete entry
Property-Substance Tables, −**150**. *Delete* 2328
307 **60**: *For* 4516 *read* 4077.1.
308 **96**: *Delete* 𝔅2968
116: *After* 𝔅3347 *insert* 67.
310 **255**: *After* 4931 *insert* 𝔅2968.
261: *Delete* 3862.
285: *After* 2620 *insert* 3862.
292: *Delete* 3848
310: *After* 1385 *insert* 3846.
311 **93**: *Delete* 171
106: *Delete* 2328
115: *Delete* 2942.1.
116: *Delete* 67.
180: *For* 4516 *read* 4077.1
318 **0.760**: *Delete* 2328 and 2330
319 $C_{12}H_{24}O_2$. *For* capronate *read* caproate
$C_{22}H_{44}O_2$ *For* capranate *read* caprate
322 $SrC_2H_4(SO_3)_2 \cdot H_2O$. *For* Strontium disulfonate *read* Strontium ethane disulfonate
331 $C_{11}H_{13}O_2N$ *For* Glutaric aniline *read* Glutaricamlide
353 ([388]), Sasahara For 329 read 210
358 Odoriferous Materials, Classification
For fragantes *read* fragrantes

Allyl	Alliaceous
empyreumatic	empyreumatici
tetri	tebri
nauseois	nauseosi

360 Column 1, line 3 *For* 6.06 × 10^{23} *read* 6.06 × 10^{23}
Columns 1 and 2, table heading *For* Molecules per cc *read* Molecules per 0.01 cm^3

Page

362 Column 2, line 8. *For* $V = 0.0342a^{1/3}$ *read* $V = 0.0342a^{1/4}$.
Above Remarks Concerning the Nomenclature there should be a rule extending across entire page.
Column 2, Note 9. *For* DAl *read* *D*Al.
363 Series of Thorium, Thoron. *For* 0.574 *read* 0.0574
364 Column 2, Tables (*b*) and (*c*) *For* cm^{-2} *read* cm^2.
366 Chemical Effects of α-Particles, column 1, line 3 *After* α-particles *insert* in the time the *M* are reacting
equation, line 12. *For* ln *read* $\log_e$
368 Column 1, line 4 *For* $T_{1/2}$ *read* T (*cf.* p. 362, column 1, line 14).
372 Column 2, Literature
([4]). *For* **151**:1751 *read* **150**:1750.
([10]). **10**:11 **11**:628
373 Lit. column. *For* ([99]) *read* ([96]).
375 Lit. column. *For* ([97]) *read* ([98]).
376 Column 2. For Japan ([42]) read Japan ([41]).
377 Column 2, *Hokutolite* For ([42]) read ([41]).
Column 2, S. For *Skaldowskite* read *Sklodowskite*.
Column 2, *Torbernite* For ($UCaPO_xaq$) read ($UCuPO_xaq$)
Column 2, Y For *Yitrotantalite* read *Yttrotantalite*.
379 Oceanic Deposits Data from ([138]) have been superseded by t the author's later work (Joly, *3*, **24**:691,12) and should read.

	No specimens	Ra mean
Blue mud		
1240 fath	1	1.6
"Ooze"		
720 fath	1	1.7
Globigerina ooze		
199 to 2493 fath	4	3.3
3 of above samples		3.1
Radiolarian ooze		
2600 to 2750 fath	2	13.1
Red clay		
2350 fath	1	11.0

380 The Loetschberg Tunnel *For* Aplete *read* Aplite.
Meteorites, Remarks *For* hexahydrite *read* hexahedrite
381 Column 1, line 2 of table *For* Anondoga *read* Onondaga
Column 2, ([138]). *For* Joly, *3*, **16**:190,18 *read* Joly, *3*, **16**:190;08.
382 Lines 2 and 3 of table *For* Felixtowe *read* Felixstowe.
Line 16 of table *For* Frier *read* Friar
Line 29 of table. *For* Charnokite *read* Charnockite
392 Characteristics of Members of Solar System
Sidereal rotation of Sun *For* 25.3 *read* 25.0
Number of satellites Mars *For* 0 *read* 2
Jupiter 7 9
Saturn 9 10
Column 1, line 2 bottom. *For* 24 da *and* 30 da *read* 24.5 da *and* 30.6 da, respectively
Column 2, Constant of notation *For* notation *read* nutation.
Column 2, Constant of aberration. Add this note. Astronomers now generally accept a value near 20.52, but the Paris conference value is used in the computation of the national ephemerides.
Column 2, Solar parallax Add this note. The direct determination (8.806″) is by far the most reliable, the one from the velocity of light is based upon the value for the constant of aberration adopted at the Paris conference of 1896, which is smaller than the value now generally accepted The two others are from the nature of the case somewhat uncertain
Column 2, Inclination of Moon's orbit to ecliptic. *For* about 5° *read* 5° 8′ 43″
394 Table 1, item 6 *For* meridonal *read* meridional
398 Column 1, Greenwich, *g* *For* 981.184 *read* 981.188
Column 1, Kew, *g* *For* 981.144 *read* 981.201

OF
L'BR
8 NOV. 1926
NGAL

INTERNATIONAL CRITICAL TABLES

NATIONAL AND LOCAL SYSTEMS OF WEIGHTS AND MEASURES

CHARLES-ÉDOUARD GUILLAUME AND CHARLES VOLET

Plan.—Section A: International Metric System; list of countries in which its use was compulsory on January 1, 1925, list of those in which its use was either legally optional or partially compulsory on same date.

Section B: Other modern systems; the more important units at present in use or in use before adoption of metric system.

Section C: Weights and measures of antiquity.

Style and Abbreviations.—Only the singular number of the names of the units are used; ten meters will appear as 10 meter Units of area and of volume will be written in the form centimeter^2 (=cm^2) and centimeter^3 (=cm^3), respectively.

i.	Value given is only approximate.
h.	Units have changed from time to time.
m^2	Square centimeter = centimètre carré = Quadratzentimeter = centimetro quadrato.
urrent	Units, other than metric, which are now in use; some of the units included in this class are practically obsolete. (*See* Local.)
ocal	Units of local or native origin or derivation which are in use, but which are embraced neither by the metric system nor by that of the central government. Applies mainly to colonial possessions (*See* Current.)
n^3	Cubic meter = mètre cube = Kubikmeter = metro cubico.
c.	International metric system compulsory since .
o.	International metric system legally optional since
lder	Units used before adoption of international metric system.
lder =	The older units were those of . .
rovincial	Units vary from one province or city to another
ince	. = . . Since the units have been the same as those of . .
.	*Vide* = see.
ar.	Units are variable, not rigidly defined.

A. INTERNATIONAL METRIC SYSTEM

The decimal metric system, established in France by the Loi du 7 Avril, 1795, and represented by standards deposited in the Archives de France, became international on May 20, 1875, by the action of the Convention Internationale du Mètre. The new standards, of platinum-iridium, constructed at that time and serving as the basis of the international system, were copied from those of the Archives.

On January 1, 1925, the metric system was compulsory in:

Algeria
Allemagne
Argentina
Austria
Autriche
Belgium
Bolivia
Brazil
Bulgaria
Chile
Colombia
Congo, Belgian
Costa Rica
Cuba
Czechoslovakia
Denmark
Deutschland
Ecuador
Equateur
Espagne
Filippine
Finland
France
Germany
Gioppóne
Greece
Guam
Guatemala
Haiti
Holland
Honduras
Hungary
Iceland
Italy & colonies
Japan
Kolumbien
Kongo, Belgisch
Kuba
Luxemburg
Malta
Mauritius
Mexico
Netherlands & colonies
Nicaragua
Norway
Olanda
Österreich
Panama
Pay-Bas & colonies
Philippine Islands
Peru
Poland
Porto Rico
Portugal and colonies
Rumania
Russia
Salvador
Schweden
Schweiz
Serbie-Croatie-Slovénie
Seychelles Islands
Siam
Spain
Suède
Suisse
Svézia
Svizzera
Sweden
Switzerland
Tchécoslovaquie
Tunis
Ungarn
Ungheria
Uruguay
Venezuela
Yugoslavia

On the same date, it was legally optional or partially compulsory in:

Canada
China
Egypt
Ethiopia
Great Britian
India, British
Ireland, Northern
Irish Free State
Paraguay
Turkey
United States of America

The fundamental units are METER (m), which is the distance at 0°C between the axes of two lines ruled on the prototype deposited at the Bureau international des Poids et Mesures, Sèvres, France; KILOGRAM (kg), which is the mass of the prototype deposited at the same Bureau; and LITER (l), which is the volume of one kilogram of pure water at the temperature of its maximum density, under the pressure of one normal atmosphere.[1]

The primary units of the system are the *meter* (m), *micron* (μ) = 10^{-6} meter, *gram* (g) = 10^{-3} kilogram, *liter* (l), *are* (a) = area of a square with a side 10 meter long, and *stere* (s) = volume of a cube with an edge one meter long. The units of area [of volume], characterized by the adjective square [cubic], are *not* derived from a primary unit, but are each defined as the area [volume] of a square [cube] with side [edge] equal to the stated unit of length. The names of other secondary units are formed by attaching to the name of a primary unit certain prefixes of unvarying significance.

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[1] Normal atmosphere, v p 18.

Secondary units.

Length m = meter		
μ	micron*	$= 10^{-6}$ m
mm	*millimeter*	$= 10^{-3}$ m
cm	centimeter	$= 10^{-2}$ m
dm	decimeter	$= 10^{-1}$ m
dkm	dekameter	$= 10$ m
hm	hectometer	$= 10^2$ m
km	kilometer	$= 10^3$ m
Mm	myriameter	$= 10^4$ m
	megameter	$= 10^6$ m

* $m\mu$ millimicron $= 10^{-9}$ m $\mu\mu$ micromicron $= 10^{-12}$ m

Mass g = gram		
μg*	microgram	$= 10^{-6}$ g
mg	milligram	$= 10^{-3}$ g
cg	centigram	$= 10^{-2}$ g
dg	decigram	$= 10^{-1}$ g
dkg	dekagram	$= 10$ g
hg	hectogram	$= 10^2$ g
kg	kilogram	$= 10^3$ g
q	metric quintal $= 10^2$ kg	$= 10^5$ g
t	metric ton $= 10^3$ kg	$= 10^6$ g
c	metric carat	$= 200$ mg

* Symbol γ also used

Capacity l = liter = 1.000 027 dm³		
μl*	microliter	$= 10^{-6}$ l
ml	milliliter	$= 10^{-3}$ l
cl	centiliter	$= 10^{-2}$ l
dl	deciliter	$= 10^{-1}$ l
dkl	dekaliter	$= 10$ l
hl	hectoliter	$= 10^2$ l

* Symbol λ also used

Area m² = square meter		
mm²	square millimeter	$= 10^{-6}$ m²
cm²	square centimeter	$= 10^{-4}$ m²
dm²	square decimeter	$= 10^{-2}$ m²
a	are	$= 10^2$ m²
ha	hectare	$= 10^2$ a
km²	square kilometer	$= 10^6$ m²

Volume m³ = cubic meter		
mm³	cubic millimeter	$= 10^{-9}$ m³
cm³	cubic centimeter	$= 10^{-6}$ m³
dm³	cubic decimeter	$= 10^{-3}$ m³
km³	cubic kilometer	$= 10^9$ m³
ds	decistere = 0.1 s	$= 10^{-1}$ m³
s	stere	$= 1$ m³
dks	dekastere = 10 s	$= 10$ m³

B. MODERN SYSTEMS

Abyssinia.—var.: current, *ca.*:

Length

1 pic = 0.686 m
1 farsang = 5.07 km
1 berri = $\frac{1}{3}$ farsang

Mass

1 rottolo = 311 g
Unit Rottolo
1 drachm = } $\frac{1}{120}$
1 derime = }
1 wakea = $\frac{1}{12}$
1 mocha = $\frac{1}{10}$

Capacity, dry

1 madega = 0.44 l
1 ardeb = 10 or 24 madega

Capacity, liquid

1 kuba = 1.016 l

Ägypten *v.* Egypt.

Äthiopien *v.* Ethiopia.

Algeria.—Since 1843 = France. Older:

Length

1 pic (dzera à torky) = 0.640 m
1 pic (dzera à rabry) = 0.480 m
Unit Pic
1 termin = $\frac{1}{8}$
1 rebia = $\frac{1}{4}$
1 nus = $\frac{1}{2}$

Mass

1 ukkia = 34.13 g
1 metical = *ca.* 4.7 g
Unit Ukkia
1 rottolo à thary = 16
1 rottolo à khadhary = 18
1 rottolo à kebyr = 24
1 cantar = 100 rottolo

Capacity, dry

1 caffiso = 317.47 l
1 saah = 58 l
1 tarri = $\frac{1}{16}$ caffiso

Capacity, liquid

1 khoull = $16\frac{2}{3}$ l or 16 l

Allemagne *v.* Germany.

Anam.—var.: ch., current:*

Length

1 thuoc moc = 0.425 m
1 thuoc de ruong = 0.470 m
1 thuoc vai = 0.644 m
Unit Thuoc
1 ly = 0.001
1 phan = 0.01
1 tat = 0.1
1 tam } = 5
1 ngu }
1 truong = 10
1 sao = 15
1 chai vai } = 30
1 that }
1 mao = 150
1 gon = 300

Mass

1 dong = 3.775 g
1 picul = 60 kg
Unit Dong
1 hao = 0.001
1 li = 0.01
1 fan = 0.1
1 luong = 10
1 neu = 100
1 can = 160
1 yen = 1600
1 binh = 8000
1 ta = 16 000
1 quan = 18 000

Area

1 ngu² = 4.5156 m²
Unit Ngu²
1 thuoc = 6
1 sao = 90
Unit Ngu²
1 mau = 900
1 quo = 1800

Capacity

1 hao or shita = 28.26 l
1 tao = 2 hao

Angola.—m.c. 1910.

Arabia.—Provincial, current

Length

1 covid = 0.482 m
1 guz = 0.635 m
1 cassaba = 3.84 m
1 farsakh = 4.83 km
Unit Farsakh
1 baryd = 4
1 marhala = 8

Mass

1 maund = 1350 g
1 ratl = *ca.* 460 g
Unit Maund
1 coffilas = $\frac{1}{400}$
1 vakias } = $\frac{1}{40}$
1 tukeas }
1 farzil } = 10
1 farecella }
1 bahar } = 150
1 bokard }

Capacity, dry

1 téman = 85 l
Unit Téman
1 mecmeda } = $\frac{1}{40}$
1 kella }
1 mec dema = $\frac{1}{80}$

Capacity, liquid

1 nusfiah = 0.79 l or
= 0.95 l
Unit Nusfiah
1 vakia = $\frac{1}{16}$
1 cuddy = 4
1 zudda = 8

Argentine Republic.—m.c. 1887; m.o. 1863. Older,* provincial:

Length

1 vara = 0.8666 m
Unit Vara
1 linéa = $\frac{1}{432}$
1 pulgada = $\frac{1}{36}$
1 pié = $\frac{1}{3}$
1 braza = 2
1 cuadra = 150
1 legua = 6000

Mass

1 libra† = 459.4 g
Unit Libra
1 grano = $\frac{1}{9216}$
1 adarme = $\frac{1}{256}$
1 onza = $\frac{1}{16}$

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* By an ordinance of 1872, units were defined in terms of metric.

* National system derived from ol Spanish. Units given are those o province of Buenos Aires.

† 1 libra de farmacia = $\frac{3}{4}$ libra = 344.5 g.

Unit Libra
1 arroba = 25
1 quintal = 100
1 tonelada = 2000

Area

1 vara² = 0.75 m²

Capacity, dry

1 fanega = 137.1977 l
Unit Fanega
1 cuartilla = $\frac{1}{4}$
1 tonelada = 7.5
1 lastre = 15

Capacity, liquid

1 frasco = 2.375 l
Unit Frasco
1 octava = $\frac{1}{16}$
1 cuarta = $\frac{1}{4}$
1 baril = 32
1 cuarter = 48
1 pipa = 192

Austria.—m.c. 1876; m.o. 1873. Older:

Length

1 Fuss* = 0.316 08 m
1 Ell = 0.7792 m
Unit Fuss
1 Punkt = $\frac{1}{1728}$
1 Linie = $\frac{1}{144}$
1 Zoll = $\frac{1}{12}$
1 Klafter = 6
1 Meile = 24 000

Mass, (1) ordinary

1 Pfund = 560.01 g
Unit Pfund
1 Pfennig
1 Denat } = $\frac{1}{512}$
1 Quentchen = $\frac{1}{128}$
1 Loth = $\frac{1}{32}$
1 Unze = $\frac{1}{16}$
1 Vierding = $\frac{1}{4}$
1 Mark = $\frac{1}{2}$
1 Stein = 20
1 Zentner = 100
1 Saum = 275
1 Karch = 400

Mass, (2) for drugs

1 Pfund apoth. = $\frac{3}{4}$ Pfund
= 420.01 g
Unit Pfund apoth.
1 Gran = $\frac{1}{5760}$
1 Scrupel = $\frac{1}{288}$
1 Drachme = $\frac{1}{96}$
1 Unze = $\frac{1}{12}$

Area

1 Joch = 1600 Klafter²
= 57.557 a
1 Metze = $\frac{1}{3}$ Joch

Capacity, dry

1 Metze = 61.489 l
Unit Metze
1 Probmetze = $\frac{1}{1024}$
1 Becher = $\frac{1}{128}$
1 Futtermassel = $\frac{1}{32}$
1 Muthmassel = $\frac{1}{16}$
1 Achtel = $\frac{1}{8}$
1 Viertel = $\frac{1}{4}$
1 Muth = 30

Capacity, liquid

1 Mass = 1.4151 l
Unit Mass
1 Pfiff = $\frac{1}{8}$
1 Seidel = $\frac{1}{4}$
1 Halbe = $\frac{1}{2}$
1 Viertel = 10
1 Eimer = 40
1 Fass = 400
1 Dreiling = 1200
1 Fuder = 1280

Balearic Islands.—*v* Spain. Local:

Length

1 canna = 1.564 m
1 palmos = $\frac{1}{8}$ canna

Mass

1 rottolo = 408 g
Unit Rottolo
1 libra major = 3
1 corta = 9
1 quartano = 9
1 arroba = 26
1 misura = 36
1 cantaro barbaresco = 100
1 cantaro = 104
1 cargo = 312

Capacity, dry

1 quartera = 71 97 l
Unit Quartera
1 barcella = $\frac{1}{6}$
1 almude = $\frac{1}{86}$

Capacity, liquid

1 quartin = 27.14 l
Unit Quartin
1 quarte = $\frac{2}{13}$
1 quarta = $\frac{1}{26}$

Bavaria *v*. Germany.

Belgian Congo—m.c. 1911.

Belgium.—m.c. 1820; at first with the names: aune = m, litron = l, livre = kg, once = hg, lood = dg, wigtje = g. Older:

Length

1 perche = 6.497 m
1 pied = $\frac{1}{20}$ perche

Mass

1 livre = 489.5 g
Unit Livre
1 loth = $\frac{1}{32}$
1 once = $\frac{1}{16}$
1 marc = $\frac{1}{2}$
1 stein = 8
1 quintal = 100
1 chariot = 165
1 balle = 200
1 schiffpfund = 300
1 charge = 400

Area

1 arpent = 400 perche²
= 130.6 a

Birmanie *v*. British India, Rangoon.

Bolivia.—m.c. 1893; m.o. 1871. Older = Spain.

Brazil. m.c 1862 Older *

Length

1 pé = 0.33 m
Unit Pé
1 palmo = $\frac{2}{3}$
1 vara = $3\frac{1}{3}$
1 passo geometrico = 5
1 braca = $6\frac{2}{3}$
1 legoa = 20 000

Mass

1 libra = 459.05 g
Unit Libra
1 onza = $\frac{1}{16}$
1 marco = $\frac{1}{2}$
1 arroba† = 32
1 quintal = 128
1 tonelada = 1728

Area

1 tarefa = 30 to 40 a
1 alqueire = 242 or 484 a

Capacity

1 almude = 31.944 l
1 alqueire = 40 to 320 l
Unit Almude
1 canada = $\frac{1}{12}$
1 pipa = 15
1 tonel = 30

Britain, British *v*. Great Britain.

British India.—m.o. 1920. Current: British and local. Local,‡ provincial:

BOMBAY.

Length

1 guz = 0.6858 m
Unit Guz
1 tassoos = $\frac{1}{24}$
Unit Guz
1 hath
1 covid } = $\frac{2}{3}$
1 cubit

Mass

1 seer = 317.5147 g
Unit Seer
1 tank = $\frac{1}{72}$
1 pice
1 parah } = $\frac{1}{30}$ or $\frac{1}{16}$
1 maund = 40
1 candy = 800

Area

Unit Are
1 ground = 2.03
1 biggah = 24.68
1 kani = 30.75
1 cawnie = 54
1 chahar = 2962

Capacity

1 parah = 110.1 l
Unit Parah
1 tipree = $\frac{1}{128}$
1 seer = $\frac{1}{64}$
1 adoulie = $\frac{1}{16}$
1 candy = 8
1 garce = 80

CALCUTTA.

Length

1 guz* = 0.9144 m
Unit Guz
1 jaob
1 jow } = $\frac{1}{144}$
1 unglee = $\frac{1}{48}$
1 moot = $\frac{1}{12}$
1 span = $\frac{1}{4}$
1 covid
1 haut } = $\frac{1}{2}$
1 danda = 2
1 niranga = 10
1 coss = 2000

Mass

1 seer = 933.04 g
Unit Seer
1 ruttee = $\frac{1}{7680}$
1 masha = $\frac{1}{960}$
1 tolah
1 sicca } = $\frac{1}{80}$
1 chittack = $\frac{1}{16}$
1 pouah = $\frac{1}{4}$
1 raik = $\frac{5}{4}$
1 pally
1 dhurra } = 5
1 maund (bazar) = 40

Area

1 guz² = 0.836126 m²
Unit Guz²
1 chattack = 5
1 cottah = 80
1 biggah = 1600
1 tenab = 2500

---

* Vienna.

* Those of Portugal, with notable local differences

† 1 arroba metrica = 15 kg

‡ Local or national measures are now defined by their equivalents in British units

* Old guz = 0.915 m.

British India.—*Cont'd.*

Capacity

1 pally = 5.0 to 5.5 l

Unit	Pally
1 chattack	= $\frac{1}{80}$
1 khoonke	= $\frac{1}{64}$
1 kunk	= $\frac{1}{16}$
1 raik	= $\frac{1}{4}$
1 soally	= 20
1 khahoon	= 320

CEYLON.

Length

1 covid = 0.461 m

Mass

1 candy, 1 bahar = 226.8 kg

Capacity

1 ammonam = 203.4 l

Unit	Ammonam
1 parrah	= $\frac{1}{4}$
1 seer	= $\frac{1}{288}$

MADRAS.

Length

1 covid = 0.472 m

Mass

1 seer = 283.495 g

1 cafh = 1.230 447 mg

Unit	Cafh
1 fanam	= 80
1 pagoda	= 2880

Unit	Seer
1 pagoda	= $\frac{1}{80}$
1 pollam 1 varahan	= $\frac{1}{8}$
1 powe	= $\frac{1}{4}$
1 vis	= 5
1 maund	= 40
1 candy	= 800

Area

1 cawnie = 53.41 a

1 maoney = $\frac{1}{24}$ cawnie

Capacity

1 puddy = 1.533 l

Unit	Puddy
1 olluck	= $\frac{1}{8}$
1 measure	= 1
1 marcal	= 8
1 parah	= 40
1 garce	= 3200

RANGOON.

Length

1 sandong = 0.5588 m

Unit	Sandong
1 palgat	= $\frac{1}{22}$
1 taim 1 cubit	= $\frac{9}{11}$
1 lan	= 4
1 bamboo 1 dha	= 7
1 oke thapal	= 140
1 dain	= 7000

Mass

1 tical = 16.32 g

Unit	Tical
1 ruay	= $\frac{1}{64}$
1 pai	= $\frac{1}{16}$
1 moo	= $\frac{1}{8}$
1 mat	= $\frac{1}{4}$
1 cattie	= $33\frac{1}{3}$
1 viss	= 100
1 candy	= 15 000

Capacity

1 byee = 0.505 l

Unit	Byee
1 lamany	= $\frac{1}{8}$
1 zalay	= $\frac{1}{4}$
1 zayoot	= 2
1 seit	= 4
1 kwai	= 8

STRAITS SETTLEMENTS.

Mass

1 kati = 604.79 g

Unit	Kati
1 tahil	= $\frac{1}{16}$
1 pikul	= 100
1 bhara	= 300
1 koyan	= 4000

Capacity

1 gantang* = 4.545 96 l

Unit	Gantang
1 para	= 10
1 koyan	= 800

Bulgaria. m.c. 1892.

Burma *v.* British India.

Cambodia *v.* Indo-China.

Canada.—m.o. 1871. Current = British,† French names are:

Length

1 pouce = 1 inch

1 chainon = 1 link

1 pied = 1 foot

1 verge = 1 yard

1 perche = 1 rod, pole

1 chaine = 1 chain‡

Mass

1 livre = 1 pound av.

1 cent, 1 quintal = 1 hundred weight

1 tonneau = 1 short ton

Area

1 arpent = 34.196 a

Capacity

1 pinte = 1 quart

1 chopine = 1 pint

1 boisseau = 8 gallons

1 minot = 39.025 l

---

* Gantang = British gallon

† Old French measures have been used, but only minot and arpent are now in use.

‡ Gunther's.

Ceylon *v.* British India.

Chile.—m.c. 1848. Older were from Spanish; legal values:

Length

1 bara = 0.836 m

Unit	Bara
1 linea	= $\frac{1}{432}$
1 pulgada	= $\frac{1}{36}$
1 pié	= $\frac{1}{3}$
1 cuadra	= 150
1 legua	= 5400

Mass

1 libra = 460.093 g

Unit	Libra
1 granos	= $\frac{1}{9216}$
1 adarme	= $\frac{1}{256}$
1 castellano	= $\frac{1}{100}$
1 onza	= $\frac{1}{16}$
1 arroba	= 25
1 quintale	= 100

Area

1 bara² = 0.698 896 m²

Capacity, dry

1 almude = 8.083 l

1 fanega = 12 almude

Capacity, liquid

1 cuartillo = 1.111 l

1 arroba = 32 cuartillo

China.—m.o. 1903 with the following names:

Length

kilometer = sin li

hectometer = sin yin

dekameter = sin tchang

meter = sin tchi

decimeter = sin tshwen

centimeter = sin fen

millimeter = sin li

Area

hectare = sin khing

are = sin meou

centare = sin li

Capacity

kiloliter = sin ping

hectoliter = sin chi

dekaliter = sin teou

liter = sin cheng

deciliter = sin ho

centiliter = sin cho

milliliter = sin tshwo

Great diversity in national system; since 1908, defined by metric equivalents. (The orthography here employed is arbitrary; there is diversity in provincial pronunciation.)

Length

1 tchi = 0.32 m

Unit	Tchi
1 hoé	= 10^{-6}
1 su	= 10^{-5}
1 hao	= 10^{-4}
1 li	= 10^{-3}
1 fen	= 10^{-2}
1 tsouen	= 10^{-1}
1 pou	= 5
1 tchang	= 10
1 yin 1 van	= 100
1 fen	= 120
1 kyo	= 300
1 li	= 1800
1 poû	= 18 000
1 thsan	= 144 000
1 tou	= 450 000

Mass

1 liang = 37.301 g

Unit	Liang
1 hao	= 0.0001
1 li	= 0.001
1 fen	= 0.01
1 tsien	= 0.1
1 kin 1 tchin	= 16
1 kwan	= 480
1 tan	= 1600
1 shih	= 1920

Area

1 meou = 6000 tchi² = 614.4 m²

Unit	Meou
1 hao	= $\frac{1}{1000}$
1 pou² 1 kung	= $\frac{1}{240}$
1 lyi	= $\frac{1}{100}$
1 fen	= $\frac{1}{10}$
1 kish	= $\frac{1}{4}$
1 king	= 10
1 ching	= 100

Volume

1 tchi³ = 32.768 dm³

1 ma, 1 fang = 100 tchi³

Capacity

1 cheng = 1.035 44 l

Unit	Cheng
1 quei	= 0.0001
1 ço	= 0.001
1 chao	= 0.01
1 yo	= 0.5
1 khô	= 0.1
1 to	= 10
1 hou	= 50
1 chei 1 sei	= 100
1 ping	= 500

Capacity, liquid

Liquids are measured by weight.

Chypre, Cipro *v.* Cyprus.

Cochin-China *v.* Indo-China.

Columbia.—m.c. 1854, but following, derived from metric system, are current:

Length

1 **vara** = 0.8 m
Unit Vara
1 pulgada = $\frac{1}{32}$
1 cuarta = $\frac{1}{4}$
1 cuadra = 100
1 legua = 6250

Mass

1 libra = 500 g
Unit Libra
1 onza = $\frac{1}{16}$
1 arroba = 25
1 quintal = 100
1 saco = 125
1 carga = 250
1 tonelada = 2000

Area

1 vara² = 0.64 m²
1 fanegada = 10 000 vara²

Cirénaïque *v.* Tripoli.

Congo, Belgian.—m.c. 1911.

Costa Rica, Guatemala, Honduras, Nicaragua, Salvador.—m.c. 1912 by a joint convention; in partial use at earlier dates. Older (modified Spanish, English, and local):

Length

1 vara = 0.8393 m (Costa Rica)
= 0.8359 m (Guatemala)
= 0.8128 m (Honduras)
Unit Vara
1 cuarta = $\frac{1}{4}$
1 tercia = $\frac{1}{3}$
1 mecate = 24

Mass

1 caja = 16 kg
1 fanega = 92 kg
1 carga = 161 kg

Area

1 manzana = 10 000 vara²
= 6960.5 m² (Costa Rica)
= 6987.4 m² (Guatemala)
= 6987.4 m² (Nicaragua)
1 caballeria = 64 manzana

Capacity

1 botella = 0.63 to 0.67 l
1 cajuela = 16.6 l

Cuartillo is very variable.

Cuba.—m.c. 1858, but others (old Spanish, American, and local) are current:

Mass

1 tonelada = 1015.65 kg
1 tercio = 72.22 kg

Area

1 caballeria Cubana = 1342.02 a
1 cordele = $\frac{1}{324}$ caballeria

Capacity

1 bocoy = 136.27 l
1 barrile = $\frac{1}{6}$ bocoy

Cyprus.—British system. Accepted equivalents:

Length

1 pic = 2 foot
= 0.6096 m

Mass

1 oke = 2.8 pound av
= 1270.06 g
1 moosa* = 50 700 g
Unit Oke
1 drachme = $\frac{1}{400}$
1 rottolo = 0.44
1 stone = 5
1 kantar = 44
1 kantar (Aleppo) = 180
1 ton = 800

Area

1 donum = 1600 yard²
= 13.378 a
1 scala = 1 donum

Capacity

1 oke = 1.278 55 l
1 cass = 4.73 l
1 kile† = 36.368 l
1 medimno = 75.05 l
1 kartos = 4 oke
1 kouza = 8 oke
1 gomari = 128 oke

Cyrenaïca *v.* Tripoli.

Czechoslovakia.—m.c. 1876 ‡ Local:

Length

1 latro = 1.917 m

BOHEMIA.

1 stopa§ = 0.296 m
1 sah = 1.778 m
1 mile = 7.003 km

PRAGUE

1 loket = 0.593 m

MORAVIA.

1 stopa§ = 0.284 m
1 loket = 0.594 m

SILESIA.

1 loket = 0.579 m
1 mile = 6.483 km

Area

BOHEMIA.

1 merice = 19.99 a
1 korec
1 strych } = 28.78 a
1 mira
Unit Korec
1 jitro = 2
1 lan = 60

* Moosa = hundredweight

† Kile = bushel.

‡ Old Vienna (v. Austria) and some local measures were still in use when the state was established

§ Stopa = strevic.

Capacity

1 merice* = 70.6 l
1 korec
1 strych } = 93.592 l

Denmark.—m.c. 1912; m.o. 1910. Older:

Length

1 fod = 0.313 857 m
Unit Fod
1 linie = $\frac{1}{144}$
1 tomme = $\frac{1}{12}$
1 aln = 2
1 faon, favn = 6
1 ruthe = 10
1 mil = 24 000

Mass

1 pund = 500 g
Unit Pund
1 es = $\frac{1}{9152}$
1 ort = $\frac{1}{512}$
1 quintin = $\frac{1}{128}$
1 loth $\frac{1}{32}$
1 unze = $\frac{1}{16}$
1 mark = $\frac{1}{2}$
1 bismerpund 12
1 lispund = 16
1 wog
1 waag } = 36
1 quintal
1 centner } = 100
1 skippund = 320
1 skvplast = 5200
1 quint = 0.1
1 ort = 0.01
1 kvint = 0.001

Area

1 tondelande = 55.162 a
1 tonde = 283.69 a
Unit Tonde
1 penge = $\frac{1}{384}$
1 album = $\frac{1}{96}$
1 fjerdingar = $\frac{1}{32}$
1 skiepper = $\frac{1}{8}$
1 pflug = 32

Capacity, dry

1 korntonde = 139.12 l
Unit Korntonde
1 pott = $\frac{1}{144}$
1 achtel = $\frac{1}{64}$
1 viertel = $\frac{1}{32}$
1 skieppe
1 ottingkar } = $\frac{1}{8}$
1 fjerdingkar = $\frac{1}{4}$
1 last = 22

Capacity, liquid

1 pott = 0.9661 l
Unit Pott
1 paegel = $\frac{1}{4}$
1 kande = 2
1 stubchen = 4

* Moravian.

Unit Pott
1 viertel = 8
1 fod³ = 32
1 anker* = 40
1 ohm* = 160
1 oxhoft* = 240
1 pipe* = 480
1 fuder* = 960

Deutschland *v.* Germany.

Dutch East Indies.—Same as Netherlands. Old Dutch and local measures are also used. Latter very variable; recently they have been legally defined by their metric equivalents. Current:

Length

1 depa = 1.70 m
Unit Depa
1 hasta = $\frac{1}{4}$
1 kilan = $\frac{1}{2}$

Mass. (1) *Ordinary*

1 pikol
1 pecul } = 61.761 3025 kg
Unit Pikol
1 thail = $\frac{1}{1600}$
1 catti
1 kati } = $\frac{1}{100}$
1 kulack = 0.0725
1 amat = 2
1 small bahar = 3
1 large bahar = 4.5
1 timbang = 5
1 kojang (Batavia) = 1667.555 kg
1 kojang (Semarang) = 1729.316 kg
1 kojang (Soerabaya) = 1852.839 kg

Mass. (2) *For precious metals*

1 thail = 54.090 g
Unit Thail
1 wang = $\frac{1}{48}$
1 tali = $\frac{1}{16}$
1 soekoe = $\frac{1}{8}$
1 reaal = $\frac{1}{2}$

Mass. (3) *For opium*

1 thail = 38.601 g
Unit Thail
1 tji = 0.1
1 tjembang Mata
1 hoen } = 0.001

Area

1 bahoe
1 bouw } = 70.965 a
1 lieue² † = 55.0632 km

Volume

1 kojang = 1.976 362 m³
1 toembak = 6.684 m³

Capacity, dry

1 kojang = 2011.2679 l
1 pikol = $\frac{1}{30}$ kojang

* Variable

† Geographic.

Dutch East Indies.—*Cont'd.*

Capacity, liquid

(Legal equivalents)

Unit	Liter
1 takar*	= 25.770
1 kit*	= 15.159
1 koelak*	= 3.709
1 kan†	= 1.5751
1 mutsje†	= 0.1516
1 pintje*	= 0.0758

Ecuador.—m.c. 1865, but the British and, more generally the old Spanish, measures are currently used.

Egypt.—m.o. 1873; m.c. in government use, 1891. Current:‡

Length

1 diraa baladi = 0.58 m
1 kassabah = 3.55 m

Unit	Diraa
1 kirat	= $\frac{1}{24}$
1 abdat	= $\frac{1}{6}$
1 kadam	= $\frac{1}{2}$
1 pie	= 1
1 gasab	= 4
1 mil hachmi	= 1000
1 farsakh	= 3000

Mass

1 oke = 1248 g

Unit	Oke
1 kirat	= $\frac{1}{6400}$
1 dirhem	= $\frac{1}{400}$
1 miskal	= $\frac{3}{800}$
1 okieh	= 0.03
1 rotoli	= 0.36
1 kantar	= 36
1 helm	= 200

Area

1 feddan = 42.008 a

Unit	Feddan
1 sahme	= $\frac{1}{576}$
1 kirat kamel	= $\frac{1}{24}$
1 feddan masri	= 1

Capacity

1 keddah = 2.0625 l

Unit	Keddah
1 kirat	= $\frac{1}{32}$
1 khanoubah	= $\frac{1}{16}$
1 toumnah	= $\frac{1}{8}$
1 robhah	= $\frac{1}{4}$
1 nisf keddah	= $\frac{1}{2}$
1 malouah	= 2
1 rob 1 roubouh	= 4
1 keila	= 8
1 ardeb	= 96
1 daribah	= 768

* For oil

† For various products

‡ In national system, units and their interrelations were very variable, but since 1891, have been defined by their metric equivalents.

England *v.* Great Britain.

Equateur *v.* Ecuador.

Eritrea.—m.o. Local, provincial:

Length

1 cubi = 0.32 m
1 emmet, 1 derah = 0.46 m

Mass

1 rotolo = 448 g
1 okia = $\frac{1}{16}$ rotolo
1 gisla = 163 kg

Capacity

1 messé = 1.50 l

Unit	Messé
1 cabaho	= 4
1 tanica	= 12
1 ghebeta	= 16
1 entelam	= 128

Espagne *v.* Spain

Esthonia.—Russian and local Current:

Length

1 archine (Russian) = 0.7112 m
1 elle (Livonian) = 0.6096 m

Unit	Archine
1 elle (Kuunar)	= 0.75
1 faden	= 3

Mass

1 pfund = 430 g

Unit	Pfund
1 quent	= $\frac{1}{128}$
1 loth	= $\frac{1}{32}$
1 liespfund	= 20
1 centner	= 120
1 tonne	= 240
1 schiffspfund	= 400

Area

Reval

1 lofstelle = 18.55 a
1 tonnland = 54.627 a

Livonian

1 lofstelle = 37.1 a
1 tonnland = 51.94 a

Capacity

1 hulmit = 11.48 l

Unit	Hulmit
1 lof (Reval)	= 3
1 lof (Livonian)	= 6
1 tonne (Livonian)	= 12

Etablissements des Détroits *v.* British India.

Etats-Unis *v.* United States.

Ethiopia.—var. Current

Length

(Approximate only)

Unit	cm
1 tat	= 2.5
1 gat	= 8
1 sinzér	= 16
1 kend	= 49

Mass

1 kasm = 3.90 g
1 neter = 336 g
1 farasula* = 13.478 kg
1 farasula† = 16.85 kg
1 farasula‡ = 17.972 kg

Unit	Kasm
1 mutagalla	= 2
1 alada	= 4
1 wogiet	= 8

Capacity

1 menelik = 1 l (approximate)

Filippine *v.* Philippine.

Finland.—m.c. 1892; m.o. 1887. Older (Russian and local):

Area

1 tunnland = 46.54 a

Capacity

1 tunna = 163.49 l
1 kannor = $\frac{1}{63}$ tunna
1 ottingar = 15.71 l
1 sextingkar = $\frac{1}{2}$ ottingar

France.—m.c. 1794. Other legal units.

Length

1 mille marin = 1852 m

Volume

1 tonneau de jauge = 2.83 m^3
1 tonneau de mer = 1.44 m^3

Old measures derived from the system of Charlemagne are:

Length

1 toise§ = 1.949 0365 m||
1 toise§ = 1.949 090 m¶

Unit	Toise
1 ligne	= $\frac{1}{864}$
1 pouce	= $\frac{1}{72}$
1 pied	= $\frac{1}{6}$
1 aune	= 0.6064
1 lieue	= 2280.3
1 mille marin	= 950.13
1 lieue marine	= 2850.4

Mass

1 livre** = 489.505 85 g

Unit	Livre
1 grain	= $\frac{1}{9216}$
1 scruple	= $\frac{1}{384}$
1 gros 1 drachme	= $\frac{1}{128}$
1 once	= $\frac{1}{16}$
1 marc ††	= $\frac{1}{2}$

* For ivory.

† For coffee.

‡ For rubber.

§ Toise de Perou at 16.25°C

|| Equivalent made legal in 1799

¶ By measurement, in 1887, by J. R. Benoit

** One livre de Charlemagne = 367.128 g

†† 1 Marc de la Rochelle = 244.75 g
1 Marc de Limoges = 240.93 g
1 Marc de Tours = 237.87 g
1 Marc de Troyes et Paris = 260.05 g

Unit	Livre
1 quintal	= 100
1 millier	= 1000

Unit	Livre (Ch)
1 sol	= $\frac{1}{20}$
1 denier	= $\frac{1}{240}$
1 obole	= $\frac{1}{480}$
1 grain	= $\frac{1}{5760}$

Area

1 pied² = 0.10552 m^2

Unit	Pied²
1 toise²	= 36
1 perche de Paris	= 324
1 perche des Eaux et Forêts	= 484
1 arpent de Paris	= 32 400
1 arpent des Eaux et Forêts	= 48 400

Capacity, dry

1 boisseau = 1.862 78 l*

Unit	Boisseau
1 litron	= $\frac{1}{16}$
1 quart	= $\frac{1}{4}$
1 minot	= 3
1 mine	= 6
1 setier	= 12
1 muid	= 144

Capacity, liquid

1 muid = 274.239 l†
1 muid = 268.241 l‡
1 pinte = 0.931 389 l§

Unit	Pinte
1 roquille	= $\frac{1}{32}$
1 posson	= $\frac{1}{8}$
1 demi-setier	= $\frac{1}{4}$
1 chopine	= $\frac{1}{2}$
1 pot	= 2
1 velte	= 8
1 quarteau	= 72
1 feuillette	= 144
1 muid	= 288

Fráncia, Isola di *v.* Mauritius.

Frankreich *v.* France.

Germany.—m.c. 1872. Since the beginning of the nineteenth century, the other units and their interrelations have been fairly definite, but before that there was great diversity. *Length:* fundamental unit was Fuss (foot), its value, depending upon the state, varied from 0.280 to 0.320 m. The one most extensively used was the Rheinlandischer Fuss (Rhenish foot) = 0.313 857 m. *Mass:* fundamental unit was Pfund

* From 1 muid = 268.241 l by relation 144 boisseau = 1 muid (see Capacity, Liquid).

† Legal value.

‡ Derived from concrete standards

§ From 1 muid = 268.241 l by relation 288 pinte = 1 muid.

(pound), its value generally varied little from 467 g; during transition period preceding 1872 the accepted equivalents were Pfund = 30 Loth = 300 Zent = 3000 Korn; Centner = 100 Pfund. Older:

BAVARIA.

Length

1 Fuss = 0.291 86 m
1 Elle = 0.833 01 m

Unit	Fuss
1 Linie	= $\frac{1}{144}$
1 Zoll	= $\frac{1}{12}$
1 Ruthe	= 10
1 Chausseemeile	= 25 406

Mass

1 Pfund = 560 g

Unit	Pfund
1 Gran	= $\frac{1}{7680}$
1 Pfennig	= $\frac{1}{512}$
1 Quint	= $\frac{1}{128}$
1 Loth	= $\frac{1}{32}$
1 Unze	= $\frac{1}{16}$
1 Zentner	= 100

Area

1 Morgen
1 Tagwerk = 34 072 a
1 Juchert
= 400 Ruthe²

Capacity, dry

1 Metzen = 37.0596 l

Unit	Metzen
1 Dreissiger	= $\frac{1}{32}$
1 Mässel	= $\frac{1}{8}$
1 Scheffel	= 6

Capacity, liquid

1 Masskanne = 1.069 03 l

Unit	Masskanne
1 Zoll³	= $\frac{1}{43}$
1 Eimer	= 60 or 64
1 Fass	= 1600

PRUSSIA.

Length

1 Fuss = 0 313 857 m

Unit	Fuss
1 Linie	= $\frac{1}{144}$
1 Zoll	= $\frac{1}{12}$
1 Ruthe	= 12
1 Meile	= 24 000
1 Elle	= 25.5 Zoll

Mass

1 Pfund = 467.711 g

Unit	Pfund
1 Quentchen	= $\frac{1}{96}$
1 Loth	= $\frac{1}{32}$
1 Stein	= 22
1 Centner	= 110
1 Schiffspfund	= 330

Area

1 Morgen = 25.532 24 a
1 Morgen = 180 Ruthe²

Capacity, dry

1 Metze = 3.435 89 l

Unit	Metze
1 Quart	= $\frac{1}{3}$
1 Zoll³	= $\frac{1}{192}$
1 Scheffel	= 16

Capacity, liquid

1 Quart = 64 Zoll³
1 Quart = 1.145 03 l

Unit	Quart
1 Anker	= 30
1 Eimer	= 60
1 Ohm	= 120
1 Oxhoft	= 180
1 Fuder	= 720

WÜRTTEMBERG.

Length

1 Fuss = 0 286 49 m

Unit	Fuss
1 Linie	= 0 01
1 Zoll	= 0.1
1 Elle	= 2 144
1 Ruthe	= 10
1 Meile	= 26 000

Mass

1 Pfund = 467.728 g
1 Apotheker-Pfund = 357 647 g

Unit	Pfund
1 Quentlein	= $\frac{1}{96}$
1 Loth	= $\frac{1}{32}$
1 Mark	= $\frac{1}{2}$
1 Zentner	= 104

Area

1 Ruthe² = 8 207 66 m²
1 Morgen = 384 Ruthe²
1 Juchart
1 Tagwerk } = 576 Ruthe²

Capacity, dry

1 Simri = 942.125 Zoll³
= 22.1533 l

Unit	Simri
1 Viertelein	= $\frac{1}{128}$
1 Erklein	= $\frac{1}{32}$
1 Vierling	= $\frac{1}{4}$
1 Scheffel	= 8

Capacity, liquid

1 Maass = 78.125 Zoll³
= 1.837 05 l

Unit	Maass
1 Schoppe	= $\frac{1}{4}$
1 Imi	= 10
1 Eimer	= 160
1 Fuder	= 960

Gioppóne *v.* Japan.

Great Britain, Irish Free State, and Northern Ireland.—m.o. 1864. Since 1898, the national measures are convertible to metric by the legally sanctioned factors given below. National fundamental units defined thus: *Length:* The yard is distance at 62°F between axes of two lines traced on gold plugs set in a bronze bar preserved at the Standards Department of the Board of Trade. *Mass:* The pound avoirdupois is the mass of a certain platinum standard, similarly preserved. *Capacity:* The gallon is the volume of 10 pounds avoirdupois of pure water, as weighed in air against brass weights, the water and air being at the temperature of 62°F and the barometer at 30 inches. In official comparisons, the density of brass is taken as 8.143 g/cm³. Some of the units in the following tables are not in current use.

Length

1 yard* (yd.) = 0 914 3992 m
1 foot (ft.) = $\frac{1}{3}$ yd.
= 30.479 97 cm
1 inch (in.) = $\frac{1}{36}$ yd.
= 2.539 998 cm

Unit	Inch
1 mil	= 0.001
1 point	= $\frac{1}{72}$
1 line	= $\frac{1}{12}$
1 barleycorn	= $\frac{1}{3}$
1 nail	= 2 25
1 palm	= 3
1 hand	= 4
1 span 1 quarter	= 9
1 foot	= 12
1 cubit	= 18
1 pace	= 30
1 yard	= 36
1 ell	= 45

Unit	Foot
1 fathom	= 6
1 pole 1 rod (rd.) 1 perch	= 16.5
1 rope	= 20
1 chain†	= 66
1 skein	= 360
1 furlong	= 660
1 cable length	= 720
1 mile (statute)	= 5280
1 mile (nautical) 1 knot	= 6080
1 league	= 15 840

Mass

1 pound avoirdupois (lb. av.)
= 453.592 45 g
= 7 000 grain
1 grain (gr.) = 64.798 182 mg

(Three systems: avoirdupois, troy, apothecary.)

Avoirdupois (av.)

(General use)

Unit	Pound
1 dram (dm.)	= $\frac{1}{256}$
1 ounce (oz.)	= $\frac{1}{16}$
1 clove or customary stone	= 8
1 stone (legal)	= 14
1 quarter	= 28
1 cental	= 100
1 hundred-weight (cwt.)	= 112
1 wey 1 load	= 252*
1 ton	= 2240

Troy (t.)

(For precious metals)

Unit	Grain
1 pennyweight (dwt.)	= 24
1 ounce (oz.)	= 480
1 pound (lb.)	= 5760

Apothecary (ap.)

(For dispensing drugs)

Unit	Grain
1 scruple (s.)	= 20
1 drachm (dr.)	= 60
1 ounce (oz.)	= 480
1 pound (lb.)	= 5760

Area

1 inch² (sq. in.)
= 6.451 5808 cm²
1 foot² (sq. ft.)
= 929.0289 cm²
1 yard² (sq. yd.)
= 0.836 1259 m²
1 acre (A.) = 4046.849 m²

Unit	Foot²
1 inch²	= $\frac{1}{144}$
1 yard²	= $\frac{1}{9}$

Unit	Yard²
1 pole² (sq. po.) 1 rod² 1 perch²	= 30.25
1 chain²† (ch.)	= 484
1 rood	= 1210
1 acre (A.)	= 4840

Unit	= Acre
1 mile² (sq. mi.)	= 640

Volume

1 yard³ (cu. yd.)
= 0.764 552 85 m³
1 foot³ (cu. ft.)
= 28 316.77 cm³
1 inch³ (cu. in.)
= 16.387 0253 cm³

Unit	Foot³
1 inch³	= $\frac{1}{1728}$
1 yard³	= 27

---

* This is the present legal equivalent of the imperial yard; recent comparisons by the National Physical Laboratory show that the yard as defined by the Weights and Measures Act of 1878 = 0 914 3987 m.

† Gunther's chain, divided into 100 link.

* Variable

† Gunther's chain.

Great Britain.—*Cont'd.*

Unit	Foot³
1 register ton	= 100
1 rod	= 1000

Capacity, dry

1 gallon (gal.) = 4.545 9631 l

1 bushel (bu.) = 8 gallon = 35.367 7018 l

Unit	Gallon
1 quartern	= $\frac{1}{2}$
1 peck	= 2
1 bucket	= 4
1 bushel	= 8
1 firkin	= 9
1 kilderkin	18
1 barrel	= 36
1 hogshead	63
1 puncheon	= 84
1 butt	= 126

Unit	Bushel
1 strike	2
1 sack	= 3
1 bag	
1 coomb	= 4
1 quarter	= 8
1 seam	8
1 chaldron	= 32*
1 wey	= 40*
1 load	
1 last	80*

Capacity, Liquid

1 gallon (gal.) = 4.545 9631 l

Unit	Gallon
1 gill	= $\frac{1}{32}$
1 quartern	
1 noggin	
1 pint	= $\frac{1}{8}$
1 quart	= $\frac{1}{4}$
1 pottle	= $\frac{1}{2}$

Greece. m.c. 1922; m.o. 1836. Older.

Length

1 piki varies 0.640 to 0.670 m

1 pie = 1 piki

1 small piki of Constantinople = 0.648 m

1 large piki of Constantinople = 0.669 m

1 piki (masonry) = 0.750 m

Mass

1 dramme = 3.2 g

1 livre (Venetian) = 450 g

1 mna = 1.5 kg

1 mine (royal) = 1.5 kg

1 oka† = 1.280 kg

1 oka = 1.250 to 1.333 kg

1 stater = 56.32 kg

1 talanton = 150 kg

Area

1 stemma = 10 a

Capacity

1 oka = 1.333 to 1.340 l

1 baril = 74.236 l

Grossbritannien *v.* Great Britain.

Guam.—Metric is compulsory

Guatemala *v.* Costa Rica.

Guinea. m.c. 1910. Older = Portugal, England, and local:

Length

1 pik = 0.578 m

1 jacktan = 3.658 m

Mass

1 benda = 64.2 g

1 kantar = 977 kg

1 gammell = $\frac{1}{4}$ kantar

Unit	Benda
1 akey	= $\frac{1}{48}$
1 mediatabla	= $\frac{1}{32}$
1 agurage	= $\frac{1}{16}$
1 quinto	= $\frac{3}{32}$
1 piso	= $\frac{1}{8}$
1 uzan	
1 seron	= $\frac{3}{16}$
1 benda (offa)	= $\frac{1}{2}$

Haiti. m.c. 1921. Older = British, old French, and Spanish; legal equivalents during transition period:

Length

1 toise = 1.9488 m

1 aune = 1.188 m

Area

1 carreau = 1292.3 m

Volume

1 baril = 0.1 m³

1 corde = 3.84 m³

1 toise = 8 m³

Holland *v.* Netherlands.

Honduras *v.* Costa Rica.

Hungary.—m.c. 1876. Older = old Vienna:

Length

1 mertfold	= 8.3536 km
1 meile	
1 marok	= 0.105 36 m
1 faust	

Area

1 hold = 43.16 a

1 joch = 43.16 a

1 meile² = 6978 ha

Volume

1 eimer	= 54.30 l
1 halbe	= $\frac{1}{64}$ eimer
1 iteze	
1 metzen	= 62.53 l
1 ako	

Iceland.—m.c. 1907. Older (analogous to Danish) were defined by their metric equivalents.

Length

1 fet = 0.313 85 m

1 sjomila = 1855 m

Unit	Fet
1 lina	= $\frac{1}{144}$
1 þumlungur	= $\frac{1}{12}$
1 alin	= 2
1 faðmur	= 6
1 mila a landi	= 24 000

Mass

1 pund = 0.5 kg

Unit	Pund
1 mark	= 2
1 fisk	= 8
1 fierding	= 40
1 liespund	= 64
1 tunna smjors	= 224
1 skippund	= 320
1 batt	

Area

1 ferfaðmur = 3.546 m²

1 fermila = 56.7383 km²

Unit	Ferfaðmur
1 ferþumlungur	= $\frac{1}{5184}$
1 ferfet	= $\frac{1}{36}$
1 feralin	= $\frac{1}{9}$
1 tundagslatta	= 900
1 engjateigur	= 1600

Capacity

1 pottar = $\frac{1}{32}$ fet³ = 0.9661 l

Unit	Pottar
1 kornskeppa	= 18
1 anker	= 39
1 almenn turma	= 120
1 öltunna	= 136
1 korntunna	= 144

India *v.* British India; *v.* Indo-China.

Indies, East *v.* British India; *v.* Dutch East Indies.

Indo-China, British *v.* British India.

Indo-China, French:

COCHIN CHINA.—m.c. 1911, with the names:

Length

1 môt thuoc = 1 m

Mass

1 môt cân tây = 1 kg

1 môt dông cân tây = 1 g

1 picul = 60 kg

Capacity

1 vuông môt bat tây = 1 l

1 vuông môt gia = 40 l

CAMBODIA.—m.c. 1914, with the names:

Length

1 muoi mètre = 1 m

Mass

1 pram rôi = 1 kg

1 muoi gramme = 1 g

1 hocsep = 60 kg

Capacity

1 muoi litre = 1 l

1 sêsep litre = 40 l

Irish Free State *v.* Great Britain.

Islande *v.* Iceland.

Italian colonies.—Metric compulsory.

Italy.—m.c. 1861; adopted in Milan as early as 1803, with the following names:

Length

metro = m

palmo = dm

dito = cm

atomo = mm

Mass

libbra nuova = kg

oncia = hg

grosso = dkg

denar = g

grano = dg

Capacity

soma = hl

mina = dkl

pinta = l

coppo = dl

Older, provincial:

Length

1 piede liprando = 0.513 77 m

Unit	Piede lip.
1 punto	= $\frac{1}{144}$
1 oncia	= $\frac{1}{12}$
1 canna	= 4
1 trabucco	= 6
1 miglio	= $4333\frac{1}{3}$

Mass

1 libbra = 307 to 398 g

Unit	Libbra
1 grano	= $\frac{1}{6912}$
1 denaro	= $\frac{1}{288}$
1 ottavo	= $\frac{1}{96}$
1 oncia	= $\frac{1}{12}$
1 rubbo	= 25
1 cantaro	= 150

Area

1 quadrao	= 38 a
1 giornata	

1 tavola = $\frac{1}{100}$ giornata

Capacity, dry

1 mine = varies 12 to 120 l

Capacity, liquid

1 barile da vino = 45.6 l

1 barile da olio = 33.4 l

---

* Variable.

† 0.85331 royal mine.

Japan.—m.o. 1893. Before 1891, great diversity; since 1891, fundamental units defined by metric equivalents.

Length

1 shaku* = $\frac{10}{33}$ m
= 0.303 0303 m

Unit — Shaku
1 shi = 10^{-5}
1 mô = 10^{-4}
1 rin = 10^{-3}
1 bu = 10^{-2}
1 sun = 10^{-1}
1 yabiki = 2.5
1 hiro = 5
1 ken = 6
1 jô = 10
1 chô = 360
1 ri† = 12 960

Mass

1 kwan = $\frac{15}{4}$ kg
= 3.75 kg

Unit — Kwan
1 shi = 10^{-7}
1 mô = 10^{-6}
1 rin = 10^{-5}
1 fun = 10^{-4}
1 candareen = 10^{-4}
1 mommé = 10^{-3}
1 niyo = 0.004
1 hyaku-mé = 0.10
1 kin = 0.16
1 ninsoku-ichi-nin = 7
1 kiyak-kin = 16
1 karus hari-ichi-da = 18
1 komma-ichi-da = 40

Area

(*Land Measure*)

1 bu = $\frac{100}{30.25}$ m²
= 3.305 785 12 m²

Unit — Bu
1 gô = 0.1
1 tsubo = 1
1 sé = 30
1 tan = 300
1 chô = 3000
1 ri² = 46 656

Capacity

1 shô = $\frac{2401}{1331}$ l
= 1.803 9068 l
= 64827 bu³

Unit — Shô
1 shaku = 10^{-2}
1 gô = 10^{-1}
1 to = 10
1 koku = 100

Kanada *v.* Canada.

Kolumbien *v.* Columbia.

Kongo *v.* Congo.

Kuba *v.* Cuba.

Latvia.—m.o. Russian and local measures since 1845. Old measures were those of Holland.

Length

1 elle = 0.537 m
1 quartier = $\frac{1}{4}$ elle
1 meile = 7 verste (Russian)
= 7.468 km

Mass

1 pfund = 419 g

For secondary units, *see* Esthonia

Area

1 kapp = 1.4864 a

Unit — Kapp
$\left.\begin{array}{l}\text{1 pourvete}\\ \text{1 loofstelle}\end{array}\right\}$ = 25
1 tonnstelle = 35

Volume

1 faden = 4.077 s

Capacity

1 stoof = 1.2752 l

Unit — Stoof
1 kanne = 2
1 kulmet = 9
1 anker = 30
$\left.\begin{array}{l}\text{1 poure}\\ \text{1 loof}\end{array}\right\}$ = 54
1 tonne = 108

Lettonie *v.* Latvia.

Luxemburg. m.c. 1820 Previously used a local unit 1 malter = 191 l.

Malacca.—

Length

1 asta = 0.457 m
1 depa = 4 asta
1 jumba = 8 asta

Mass

1 catty = 0.61 kg

Unit — Catty
1 miam = $\frac{1}{320}$
1 buncal = $\frac{1}{20}$
1 tampang = 1
1 bedur = 2
1 kip = 15
1 pecul = 100
1 bahar = 300

Area

1 jumba² = 13.38 m²
1 orlong $\left\{\begin{array}{l}= 400\text{ jumba}^2\\ = 53.52\text{ a}\end{array}\right.$

Capacity

1 chupa = *ca.* 1 l
1 gantang = 4 chupa

Malaysia *v.* British India; *v.* Dutch East Indies.

Malta.—m.c. 1914. Older, British and local (old Sicilian):

Length

1 foot = 0.2836 m
1 canna = 2.088 m
1 palmo = $\frac{1}{8}$ canna

Mass

1 rottolo = 1.75 lb. av.
= 0.793 79 kg

Unit — Rottolo
1 parto = $\frac{1}{480}$
1 ounce = $\frac{1}{30}$
1 cantaro = 100

Capacity

1 caffiso = 20.457 l
1 baril = 43.162 l
1 salma = 290.944 l

Marokko *v.* Morocco

Mauritius and Seychelles Islands. m.c. Older – old French, British, and the following:

Capacity

1 cash = 227.11 l
1 velt = $\frac{1}{30}$ cash

Mexico. m.c. 1896; m.o. 1857. Older (from Spanish, Castilian), legally defined, during transition period, in terms of metric equivalents:

Length

1 vara = 0.838 m

Unit — Vara
1 linea = $\frac{1}{432}$
1 pulgada = $\frac{1}{36}$
1 pie = $\frac{1}{3}$
1 legua = 5000

Mass

1 libra = 460.246 34 g

Unit — Libra
1 tomin = $\frac{1}{768}$
1 adarme = $\frac{1}{256}$
1 ochava = $\frac{1}{128}$
1 onza = $\frac{1}{16}$
1 arroba = 25
1 quintal = 100
1 tercio = 160

Area

1 fanega = 356.628 a

Unit — Fanega
1 caballeria = 12
1 labor = 18
1 sitio = 492 28

Capacity, dry

1 cuartillo = 1.8918 l

Unit — Cuartillo
1 almud = 4
1 fanega = 48
1 carga = 96

Capacity, liquid

1 cuartillo = 0.456 264 l
1 cuartillo for oil = 0.506 162 l
1 jarra = 18 cuartillos

Morocco.—**m.o.; local, var.:**

Length

$\left.\begin{array}{l}\text{1 cubit}\\ \text{1 canna}\end{array}\right\}$ = 0.533 m
1 pie = 0.61 m
1 tonni = $\frac{1}{8}$ pie

Mass

$\left.\begin{array}{l}\text{1 rotal}\\ \text{1 artal}\end{array}\right\}$ = 507.5 g
1 gerbe = 3 kg
1 kula = 22 rotal
1 kantar = 100 rotal

Capacity

$\left.\begin{array}{l}\text{1 sahh}\\ \text{1 fanega}\end{array}\right\}$ = 56 l
$\left.\begin{array}{l}\text{1 mudd}\\ \text{1 almude}\end{array}\right\}$ = 14 l

Mozambique *v.* Portuguese East Africa.

Netherlands.—m.c. 1820, with the names:

Length

streep = mm
duim = cm
palm = dm
elle = m
roede = dkm
mijle = km

Mass

korrel = dg
wigtje = g
lood = dkg
once = hg
pond = kg

Capacity, dry

maatje = dl
kop = l
schepel = dkl
mudde = hl
zak = hl
last = 30 hl

Capacity, liquid

vingerhoed = cl
maatje = dl
kan = l
dekaliter = dkl
vat = hl

Old national system is more or less current in some of the old colonies:

Length

(Amsterdam)

1 roeden = 3.679 77 m
1 elle = 0.687 813 m
1 voeten = 0.283 0594 m
1 duime = 25.733 mm
1 lyne = 2.144 mm

Mass

1 pond = 492.16772 g
1 pond* = 494.090 32 g

---

* The old shaku (kujirajaku) = 1.25 shaku is legal for fabrics

† One ri marin (kai-ri) = nautical ri

* Amsterdam.

Netherlands.—*Cont'd.*

1 pond (Apothecary) = $\frac{3}{4}$ pond = 369.126 g

Unit	Pond
1 mark	= $\frac{1}{2}$
1 unze	= $\frac{1}{16}$
1 drachme	= $\frac{1}{128}$
1 engel	= $\frac{1}{320}$
1 vierling	= $\frac{1}{1280}$
1 grein	= $\frac{1}{7680}$

Area

1 morgen = 81.244 346 a

Capacity, dry

1 schepel = 27.26 l

Unit	Schepel
1 kop	= $\frac{1}{32}$
1 vierd	= $\frac{1}{4}$
1 zak	= 3
1 mud	= 4
1 last	= 108

Capacity, liquid

1 mingelen = 1.200 to 1.237 l

Unit	Mingelen
1 vat	= 768
1 oxhooft	= 192
1 aam	= 128
1 anker	= 32
1 steekan	= 16
1 stoop	= 2
1 pint	= $\frac{1}{2}$
1 mutsje	= $\frac{1}{8}$

Nicaragua *v.* Costa Rica.

Niederlande *v.* Netherlands.

Northern Ireland *v.* Great Britain.

Norway.—m.c. 1882; m.o. 1879. Older differed very little from Danish; legal equivalents:

Length

1 fod = 0.3137 m

Mass

1 skaalpund = 0.4981 kg

Area

1 mal = 10 a

Capacity, dry

1 korntonde = 138.97 l

Capacity, liquid

1 pot = 0.9651 l

Oceania.—British measures.

Olanda *v.* Netherlands.

Österreich *v.* Austria.

Paési Bássi *v.* Netherlands

Panama.—Metric compulsory.

Paraguay.—Metric almost exclusively used. m.o. 1899. Older = Spain; legal equivalents:

Length

1 vara (old) = 0.838 56 m

1 cuerda, 1 cordel = 83⅓ vara = 69.88 m

1 vara = 0.866 m

Unit	Vara
1 piede	= $\frac{1}{3}$
1 pouce	= $\frac{1}{36}$
1 ligne	= $\frac{1}{432}$
1 cuadra	= 100
1 lieue	= 5000

Mass

1 libra (old) = 160.08 g

1 libra = 459 g

Unit	Libra
1 once	= $\frac{1}{16}$
1 arrobe	= 25
1 quintal	= 100
1 tonne	= 2000

Area

1 liño (old) = 48.832 a

1 liño = 100 vara²

1 liño = 75 m²

Capacity, dry

1 fanega = 288 l

1 almude = $\frac{1}{12}$ fanega

Capacity, liquid

1 frasco = 3.029 l

Unit	Frasco
1 cuarta	= $\frac{1}{4}$
1 baril	= 32
1 pipe	= 192

Pays-Bas *v.* Netherlands.

Persia.—Metric is in process of adoption. By 1924 the following assimilation had occurred: 1 zar = 1 m, 1 dram = 1 g, 1 ralte = 1 l. National measures, provincial, var.; even today, in retail commerce, cereal grains are used as weights:

Length

1 guerze (common) = 0.63 to 0.97 m = 1 monkelzer

1 zar = 1.04 m

Unit	Zar
1 gireh	= $\frac{1}{16}$
1 ouroub	= $\frac{1}{8}$
1 charac	= $\frac{1}{4}$
1 gez 1 guerze	= 1
1 farsakh 1 parasang	= 6000

Mass

1 miskal = 4.60 g

Unit	Miskal
1 una	= $\frac{1}{384}$
1 gandum 1 grain	= $\frac{1}{96}$
1 abbas	= $\frac{1}{25}$
1 nakhod 1 carat	= $\frac{1}{24}$
1 dung	= $\frac{1}{6}$
1 dartung	= 0.22
1 dirhem	= 2
1 sir	= 16
1 pinar	= 20
1 danar	= 40
1 abbassi	= 80
1 rottel	= 100
1 tcheirek	= 160
1 saddirham	= 320
1 batman (Tauris)	= 640
1 batman (Shirez)	= 1280
1 batman	= 600 to 1000
1 karvar	= 100 batman

Area

1 jerib = 1082 m² to 1153 m² = 1000 to 1066 zar²

Capacity

1 chenica = 1.32 l

Unit	Chenica
1 sextario	= 0 25
1 capichas	= 2
1 sabbitha	= 5.5
1 colluthun	= 6 25
1 legana	= 30
1 artaba	= 50

Peru.—m c. 1869. Older (from Spanish, Castillian):

Length

1 vara = 0.835 98 m

Mass

1 libra = 460.09 g

Unit	Libra
1 arroba	= 25
1 quintal	= 100
1 fanega	= 140

Area

1 topo = 27.06 a

1 fanegada = 64.596 a

Philippine Islands.—m.c. 1860. Older = Spain. Local:

Mass

1 catty = about 600 g

Unit	Catty
1 punto	= $\frac{1}{3}$
1 chinanta	= 10
1 lachsa	= 48
1 caban	= 97
1 pecul	= 100

Area

1 balita = 27.95 a

Unit	Balita
1 loan	= 0.1
1 quignon	= 10

Capacity

1 kaban = 99.90 l

1 chupa = 3.75 cm³

1 ganta = $\frac{1}{25}$ kaban

1 apatan = $\frac{1}{4}$ chupa

Poland.—Metric in process of adoption; in some provinces it has been in use since 1872. Russian system legalized in 1849, without displacing national measurements. Since 1819 these have been defined by their metric equivalents. National:

Length

1 stopa = 0.288 m

Unit	Stopa
1 linja	= $\frac{1}{144}$
1 cal	= $\frac{1}{12}$
1 lokiec	= 2
1 sazen	= 6
1 pret	= 15

Old measures

1 pied (Warsaw) = 0.2978 m

1 pied (Cracow) = 0.3564 m

1 aune = 0.620 m

Mass

1 funt = 405.504 g

Unit	Funt
1 gran	= $\frac{1}{9216}$
1 skrupul	= $\frac{1}{384}$
1 drachma	= $\frac{1}{128}$
1 lut	= $\frac{1}{32}$
1 uncja	= $\frac{1}{16}$
1 kamian	= 25
1 centnar	= 100

Old measures

1 funt = 404 g

1 centner = 16 funt

1 stein = 3.2 funt

Area

1 pret² = 18.6624 m²

1 morga = 300 pret²

1 wloka = 9000 pret²

Capacity

1 kwarta = 1 l

Unit	Kwarta
1 kwarterka	= $\frac{1}{4}$
1 garniec	= 4
1 cwierc	= 32
1 korzec	= 128

Porto Rico.—m.c. 1860. Older = Spain:

Area

1 cuerdo = 2250 vara² = 15.72 a

Portugal.—m.c. 1872; m.o. 1852. Older:*

Length

1 pe = 0.3285 m

1 estadio = 258 m

1 milha = 8 estadio

1 legoa = 24 estadio

* In some of the older colonies the old Portuguese system, more or less modified, is still in use.

Unit Pe
1 linha = $\frac{1}{144}$
1 pollegada = $\frac{1}{12}$
1 palmo = $\frac{2}{3}$
1 covada = 2
1 vara = $\frac{10}{3}$

Mass

1 libra* = 459 g
Unit Libra
1 grao = $\frac{1}{9216}$
1 escrupulo = $\frac{1}{384}$
1 outava = $\frac{1}{128}$
1 onca = $\frac{1}{16}$
1 marco, 1 meio = $\frac{1}{2}$
arratel = 1
1 arroba = 32
1 quintal = 128

Area

1 vara^2 = 1.2 m^2
Unit Vara^2
1 ferrado = 605
1 geira = 4840

Capacity, dry

1 fanga = 54 l
Unit Fanga
1 outava = $\frac{1}{32}$
1 quarto = $\frac{1}{16}$
1 meio = $\frac{1}{8}$
1 alqueira = $\frac{1}{4}$
1 moio = 15

Capacity, liquid

1 almude = 16.5 l
Unit Almude
1 quartillo = $\frac{1}{48}$
1 meio = $\frac{1}{24}$
1 canada = $\frac{1}{12}$
1 alqueira = $\frac{1}{6}$
1 bota, 1 pipa = 26
1 tonelada = 52

Portuguese Colonies.—Metric compulsory.

Portuguese East Africa (Mozambique).—m.c. 1910. Older, mainly of Portugal; one bahar is considered equivalent to 109 kg.

Prussia *v.* Germany.

Rumania.—m.c. 1884; m.o. 1866. In old Bessarabia, Russian measures replaced by metric in 1922. Older:

Length

1 halibiu = 0.701 m
1 endere = 0.662 m
1 stringene = 1.96 m

Mass

1 cantar = *ca.* 56 kg
1 oke = $\frac{1}{44}$ cantar

Capacity

1 dimerla = 24.6 l
Unit Dimerla
1 oke = $\frac{1}{16}$
1 mirze = 8
1 kilo = 16

Capacity, liquid

1 viacka = 14.15 l
1 oke = 0.1 viacka

Russia.—m.o. 1900. Definitions of fundamental national units: *Length* Archine is distance at 17°C between the axes of two lines drawn on the platinum-iridium prototype marked "H 1894." *Mass:* Fount is mass of the platinum-iridium prototype marked "H 1894." *Capacity, liquid* Vedro is volume of 30 founts of pure water at $16\frac{2}{3}$°C. *Capacity, dry* Garnetz is $\frac{4}{15}$ vedro.

Length

1 archine = 0.711 200 m
1 totchka = 0.254 0000 mm
Unit Totchka
1 ligne = 10
1 paletz = 50
1 sotka = 84
1 duime = 100
1 verchoc = 175
1 foute = 1200
1 archine = 2800
Unit Archine
1 sagène = 3
1 verste = 1500

Mass (1) Ordinary

1 fount = 409.512 41 g
1 doli = 44.434 9403 mg
Unit Doli
1 sol, 1 zolotnik = 96
1 lote = 288
1 once = 576
1 lana = 768
1 fount = 9216
Unit Fount
1 poud = 40
1 berkovets = 400
1 tonne marine = 2400

Mass (2) For drugs

Unit Doli
1 grain = 1.4
1 scrupule = 28
1 drachme = 84
1 once = 672
1 livre = 8064

Area

1 archine^2 = 0.505 8054 m^2
1 ligne^2 = 6.451 600 mm^2
Unit Ligne^2
1 duime^2 = 100
1 verchoc^2 = 306.25
1 foute^2 = 14 400
1 archine^2 = 78 400
Unit Archine^2
1 sagène^2 = 9
1 décatine = 21 600
1 verste^2 = 2 250 000

Volume

1 archine^3 = 0.359 7288 m^3
1 ligne^3 = 16.387 06 mm^3
Unit Ligne^3
1 duime^3 = 1000
1 verchoc^3 = 5359.375
1 foute^3 = 1 728 000
1 archine^3 = 21 952 000
Unit Archine^3
1 sagène^3 = 27
1 tonne marine = 7 871 72
1 last marin = 15.743 44

Capacity, dry

1 garnetz = 3.279 842 l
1 tchast = 0.109 328 07 l
Unit Tchast
1 polougarnetz = 15
1 garnetz = 30
1 lof = 592
Unit Garnetz
1 tchetverik = 8
1 polouosmina = 16
1 osmina = 32
1 tchetvert = 64

Capacity, liquid

1 vedro = 12.299 41 l
1 tcharka = 0.122 9941 l
Unit Tcharka
1 chkalik = 0.5
1 bottle (vodka) = 5
1 bottle (wine) = 6.25
1 krouchka = 10
1 shtoff = 12.5
1 vedro = 100
Unit Vedro
1 stekar = 1.5
1 anker = 3
1 pipe = 36
1 fass, 1 botchka = 40

Salvador *v.* Costa Rica.

Schottland *v.* Great Britain.

Schweden *v.* Sweden.

Schweiz *v.* Switzerland.

Scotland, Scozia *v.* Great Britain.

Serbie-Croatie-Slovénie *v.* Yugoslavia.

Seychelles Islands *v.* Mauritius.

Siam.—m.c. 1923; m.o. 1889. Older now defined by metric equivalents; those of transition period:

Length

1 wah = 2 m
Unit Wah
1 anukabiet = $\frac{1}{768}$
1 kabiet = $\frac{1}{384}$
1 niou = $\frac{1}{96}$
1 keup = $\frac{1}{8}$
1 sawk, 1 sock = $\frac{1}{4}$
1 ken = $\frac{1}{2}$
1 sen = 20
1 roeneng = 2000
1 yote = 8000

Mass

1 tchang* = 1200 g
Unit Tchang
1 klom = $\frac{1}{10240}$
1 klam = $\frac{1}{5120}$
1 pai = $\frac{1}{2560}$
1 sompay, 1 grani = $\frac{1}{1280}$
1 fuang = $\frac{1}{640}$
1 salung = $\frac{1}{320}$
1 baht = $\frac{1}{80}$
1 tamlung = $\frac{1}{20}$
1 doon = 20
1 hap = 50
1 bara = 400

Area

1 wah^2 = 4 m^2
1 ngan = 100 wah^2
1 rai = 400 wah^2

Capacity

1 tanan† = 1 l
Unit Tanan
1 niou = $\frac{1}{100}$
1 chai meu = $\frac{1}{32}$
1 kam meu = $\frac{1}{8}$
1 laang, 1 chang awn = $\frac{1}{2}$
1 kanahn = 1
1 sat = 20
1 tang = 40
1 tamlaum = 400
1 seste = 800
1 ban = 1600
1 kwien, 1 koyan = 2000 or 3200
1 cohi = 32 000

Siria *v.* Syria.

Somaliland.—m.o.; local, vary with material and province:

Length

1 top = 3.92 m
1 cubito = $\frac{1}{4}$ top

Mass

1 rottolo = 448 g

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* For drugs 1 libra = $\frac{3}{4}$ libra = 344.25 g.

* Previously, 1 tchang = 600 to 1300 g.

† Previously, 1 tanan = 0.9 to 1.2 liter.

Somaliland.—*Cont'd.*

Unit	Rottolo
1 okia	= $\frac{1}{16}$
1 frasla	= 36
1 gisla	= 360

Area

1 darat = 80 a

Capacity, dry

1 chela = 1.359 l

Unit	Chela
1 tabla	= 15
1 gisla	= 120

Capacity, liquid

1 caba = 0.453 l

Soudan *v.* Sudan.

South Africa *v.* Union of South Africa

Spain.—m c. 1860. Older,* var., provincial; Castilian:

Length

1 vara = 0 835 905 m

(Other vara comprised between 0.768 m and 0.912 m)

Unit	Vara
1 punto	= $\frac{1}{6912}$
1 linea	= $\frac{1}{576}$
1 diedo	= $\frac{1}{48}$
1 pulgada	= $\frac{1}{36}$
1 sesma	= $\frac{1}{6}$
1 palma	= $\frac{1}{4}$
1 pie	= $\frac{1}{3}$
1 codos	= $\frac{1}{2}$
1 passo	= $1\frac{2}{3}$
1 estado	= 2
1 estadal	= 4
1 milla †	= $1666\frac{2}{3}$
1 legua	= 5000 or 8000

Mass

1 libra = 460 093 g

(Other libra comprised between 350 g and 575 g)

Unit	Libra
1 grano	= $\frac{1}{9216}$
1 arienzo	= $\frac{1}{2304}$
1 tomin	= $\frac{1}{768}$
1 dinero	= $\frac{1}{384}$
1 adarme 1 dracma	= $\frac{1}{256}$
1 ochava 1 caracter	= $\frac{1}{128}$
1 escrupulo	= $\frac{3}{64}$
1 onza	= $\frac{1}{16}$
1 marco	= $\frac{1}{2}$
1 arroba	= 25
1 barril	= 50
1 quintal	= 100
1 quintalmacho	= 150
1 tonelada	= 2000

Area

1 vara² = 0.698 7372 m²

Unit	Vara²
1 cuartilla	= 25
1 celemin	= 768
1 aranzada	= 6400
1 fanega 1 fanegada	= 9216
1 yugada	= 460 800

Capacity, dry

1 fanega = 55.501 l

Unit	Fanega
1 ochavillo	= $\frac{1}{768}$
1 racion	= $\frac{1}{192}$
1 cuartillo	= $\frac{1}{48}$
1 medio	= $\frac{1}{24}$
1 celemin	= $\frac{1}{12}$
1 almude	= $\frac{1}{12}$
1 cuartilla	= $\frac{1}{4}$
1 cahiz	= 12

Capacity, liquid

(Arroba was defined as volume of 34 libra of river water The arroba for oil was volume of 25 libra of oil)

1 arroba (wine) = 16.133 l

1 arroba (oil) = 12.563 l

Unit	Arroba
1 copas	= $\frac{1}{128}$
1 quarterone 1 panilla*	= $\frac{1}{100}$
1 libra 1 cuartillo	= $\frac{1}{32}$
1 azumbre	= $\frac{1}{8}$
1 cuartilla*	= $\frac{1}{4}$
1 cantara	= 1
1 moio	= 16
1 pipa	= 27
1 bota	= 30

Stati Uniti *v.* United States.

Straits Settlements *v.* British India.

Sud-Africaine, Union *v.* Union of South Africa.

Sudan. Egyptian in use.

Suède *v.* Sweden.

Suisse *v.* Switzerland.

Svézia *v.* Sweden.

Svizzera *v.* Switzerland.

Sweden. m c. 1889; m.o. 1879. Older:

Length

1 fot = 0.296 90 m

Unit	Fot †
1 linie	= $\frac{1}{144}$
1 tum	= $\frac{1}{12}$
1 alm	= 2
1 famn	= 6
1 stang	= 16
1 ref	= 100 or 160
1 mil	= 18 000

Mass

1 skälpund = 425.076 g

Unit	Skälpund
1 as	= $\frac{1}{8848}$
1 quintin	= $\frac{1}{128}$
1 lod	= $\frac{1}{32}$
1 untz	= $\frac{1}{16}$
1 lispund	= 20
1 sten	= 32
1 centner	= 100 or 120
1 waag	= 165
1 skeppund	= 400
1 nyläst	= 12 000

Area

1 fot² = 0.088 149 61 m²

1 kappland = 1.542 618 17 a = 1750 fot²

1 ref² = 8.814 961 a

1 tunland = 49.363 781 6 a = 56 000 fot²

Capacity, dry

1 kanna = 2.617 l

Unit	Kanna
1 ort	= $\frac{1}{32}$
1 junkfra	= $\frac{1}{32}$
1 quarter	= $\frac{1}{8}$
1 stop	= $\frac{1}{2}$
1 kappar	= $\frac{7}{4}$
1 fjerdingar	= 7
1 spanna	= 28
1 tunna	= 56
1 koltunna	= 63
1 kollast	= 756

Capacity, liquid

1 kanna = 0.1 fot³ = 2.617 162 l

Unit	Kanna
1 jungfrur 1 jungfer	= $\frac{1}{32}$
1 quarter	= $\frac{1}{8}$
1 stop	= $\frac{1}{2}$
1 ankar	= 15
1 eimer	= 30
1 am 1 ohm	= 60
1 oxhufud 1 oxhoft	= 90
1 pipe	= 180
1 fuder	= 360

Switzerland.—m.c. 1877; m.o. 1868. Older, var.; during transition were fixed as follows:

Length

1 pied, 1 fuss = 30 cm

Unit	Pied
1 ligne 1 linie	= $\frac{1}{144}$
1 pouce 1 zoll	= $\frac{1}{12}$
1 aune 1 elle	= 2
1 toise 1 ruthe	= 6
1 perche	= 16
1 lieue	= 16 000

Mass (1) Ordinary

1 livre = 500 g

Unit	Livre
1 loth	= $\frac{1}{32}$
1 once	= $\frac{1}{16}$

Mass (2) For medicine

1 livre = 375 g

Unit	Livre
1 grain	= $\frac{1}{5760}$
1 scruple	= $\frac{1}{288}$
1 drachme	= $\frac{1}{96}$
1 once	= $\frac{1}{12}$

Syria.—m.o.; current:

Length

1 pic = 0.582 m

Mass

1 rottolo = 1785 g

Unit	Rottolo
1 drachme 1 pesi	= $\frac{1}{600}$
1 metecali	= $\frac{1}{400}$
1 miteal	= $\frac{1}{400}$
1 once	= $\frac{1}{60}$
1 zurbo	= 27.5
1 cola	= 35
1 cantar	= 100

Capacity

1 rotl = 3 2 l

Unit	Rotl
1 makuk	= 250
1 garava	= 450

Tchéco-Slovaquie *v.* Czechoslovakia.

Tonkin.—Same as Anam (*q v.*)

Tripoli and Cyrenaïca.—m.o., current defined by metric equivalents:

Length

1 pik = 0.68 m = 1 handaze

1 palmo = $\frac{1}{3}$ pik

1 draa = 0.46 m

Mass

1 rottolo = 512.8 g

1 oka = 2.5 rottolo = 1282 g

1 metical = 4.76 g

Unit	Rottolo
1 kharouba	= $\frac{1}{2560}$
1 dram	= $\frac{1}{160}$
1 termino	= $\frac{1}{128}$
1 uckin	= $\frac{1}{16}$
1 mattaro	= 42
1 cantar	= 100

Area

1 pik² = 0.4624 m²

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* Old national system, more or less modified, is still in use in the old Spanish colonies.

† Milla = 5000 pie.

* Oils

† The fot is also divided into decimals.

Unit Pik^2
1 denum = 1600
1 jabia = 1800

Capacity, dry

1 orba = 7.6 l
Unit Orba
1 nufsorbah = $\frac{1}{2}$
1 temen = 4
1 ueba = 16

(Measured by weight)

1 oka = 1282 g
1 marta = 11 to 14 oka
1 kele = 2 marta

Capacity, liquid

1 barile = 64.8 l
1 bozze = $\frac{1}{24}$ barile

(Measured by weight)

1 oka = 1282 g
Unit Oka
1 gorraf = 9.75
1 giarra = 58.5

Tschechoslovak *v.* Czechoslovakia.

Tunis.—m.c. 1895. Current.

Length

1 pic arabe = 48.8 cm
1 pic turc = 63.7 cm
1 pic endazé = 67.3 cm

The pic used depends upon the object measured.

Mass

1 uckir = 31.495 g
Unit Uckir
1 rottolo attari = 16
1 rottolo sucki = 18
1 rottolo khaddari = 20
1 cantaro = 100

Capacity

1 cafisso = 496 l
1 millerole (Marseilles) = *ca.* 64 l
Unit Cafisso
1 saah = $\frac{1}{129}$
1 whiba = $\frac{1}{16}$

Turkestan.

Length

1 hasch = 0.7112 m
Unit Hasch
1 archine* }
1 altschin } = 1

Mass

1 batman = 125 kg to 128 kg
Unit Batman
1 sir = $\frac{1}{8}$
1 tscharik = $\frac{1}{64}$
1 mimtscha = $\frac{1}{256}$

Turkey.—m.o.; current, var.:

Length

1 archine = 64 to 76 cm
1 archine (for architecture) = 75.77 cm
1 nul = 1 km
Unit Archine
1 nocktat = $\frac{1}{3456}$
1 hatt = $\frac{1}{288}$
1 parmack = $\frac{1}{24}$
1 ouromb = $\frac{1}{8}$
1 pic = 1

Mass

1 oka = 1283 g
Unit Oka
1 karat = $\frac{1}{6400}$
1 denke = $\frac{1}{1600}$
1 dirhem }
1 drachme } = $\frac{1}{400}$
1 miskal = $\frac{3}{800}$
1 cequi }
1 yusdrum } = $\frac{1}{4}$
1 rottel = 0.44
1 batman = 6
1 kantar = 44
1 tcheki = 176 to 195

Area

1 deunum { = 1600 archine^2 ; = 913 m^2
1 djerib = 100 a

Capacity

1 kile = 32 to 43 l
1 zira^3 = 0.435 m^3
Unit Kile
1 chinik = $\frac{1}{4}$
1 fortin = 4

Ungarn, Ungheria *v.* Hungary.

Union of South Africa.—Metric, British, and old Dutch:

Length

1 elle = 0.685 m

Mass

1 bundle = 3175 g

Area

1 morgen = 85.5 a

Capacity

1 gantang = 9.2 l
1 balli = 5 gantang
1 muid = 109.1 l
1 legger = 516 l
Unit Legger
1 kanne = $\frac{1}{388}$
1 ahm = $\frac{1}{4}$

United States of America.—m.o. 1866; m.c. for certain governmental purposes. Fundamental units of national system are defined in terms of metric units. For less common and obsolescent units, see Great Britain.

Length

1 yard (yd.) = $\frac{3600}{3937}$ m
= 0.914 401 83 m
1 foot (ft.) = $\frac{1}{3}$ yd.
= 30.480 061 cm
1 inch (in.) = $\frac{1}{36}$ yd.
= 2.540 005 08 cm
Unit Inch
1 mil = 0.001
1 hand = 4
1 span = 9
1 foot = 12
1 yard = 36
Unit Foot
1 fathom = 6
1 rod }
1 pole } = 16.5
1 perch }
1 chain* (Gunther's) = 66
1 chain* (engineer's) = 100
1 bolt = 120
1 furlong = 660
1 cable length = 720
1 mile (statute) = 5280
1 mile (nautical)† = 6080.20
1 league (statute) = 3 st. mile
1 league (nautical) = 3 n. mile

Mass

1 pound avoirdupois (lb. av.) = 453.592 4277 g
= 7000 grain (gr.)
1 grain = 64.798 918 24 mg

(Three systems: avoirdupois, troy, apothecary.)

Avoirdupois (av.)

(General use)

Unit Pound
1 dram (dr.) = $\frac{1}{256}$
1 ounce (oz.) = $\frac{1}{16}$
1 hundred-weight (cwt.) (long) = 112
1 ton (short) (sh. tn.) = 2000
1 ton (long) (l. tn.) = 2240

Troy (t.)

(For precious metals)

Unit Grain
1 pennyweight (dwt.) = 24
1 ounce (oz.) = 480
1 pound (lb.) = 5760

Apothecary (ap.)

(For dispensing drugs)

Unit Grain
1 scruple (s. or ℈) = 20
1 dram (dr. or ʒ) = 60
1 ounce (oz. or ℥) = 480
1 pound (lb.) = 5760

Area

1 inch^2 (sq. in.) = 6.451 6258 cm^2
1 foot^2 (sq. ft.) = 929.0341 cm^2
1 yard^2 (sq. yd.) = 0.836 130 71 m^2
1 acre (A.) = 4046.873 m^2
Unit Foot^2
1 inch^2 = $\frac{1}{144}$
1 yard^2 = 9
Unit Yard^2
1 rod^2 (sq. rd.) }
1 perch } = 30.25
1 chain^2* = 484
1 rood = 1210
1 acre (A.) = 4840
Unit Acre
1 mile^2 (sq. mi.) = 640
1 township† = 23 040

Volume

1 yard^3 (cu. yd.) = 0.764 559 45 m^3
1 foot^3 (cu. ft.) = 28 317.0 cm^3
1 inch^3 (cu. in.) = 16.387 162 cm^3
Unit Foot^3
1 inch^3 = $\frac{1}{1728}$
1 board foot (bd. ft.) = $\frac{1}{12}$
1 yard^3 = 27
1 shipping ton = 40
1 register ton = 100
1 cord (cd.) = 128

Capacity, dry

1 bushel (bu.) = 2150.42 inch^3
= 35.238 329 l
Unit Bushel
1 pint (pt.) = $\frac{1}{64}$
1 quart (qt.) = $\frac{1}{32}$
1 peck (pk.) = $\frac{1}{4}$
1 barrel‡ (bbl.) = 3.281
1 chaldron§ = 36
1 firkin = 9 gallon

Capacity, liquid

1 gallon (gal.) { = 231 inch^3 ; = 3.785 332 l
1 minim (min. or ♏) = $\frac{1}{61440}$ gal.
= 0.061 6102 ml
Unit Minim
1 fluid dram (fl. dr.) = 60
1 fluid ounce (fl. oz.) = 480
1 gill (gi.) = 1920

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* Russian.

* 1 link = 0.01 chain.
† 1 nautical mile = 1853.249 m

* Gunther's chain.
† 36 mile^2.
‡ For dry commodities, except cranberries, barrel = 7056 inch^3; cranberry barrel = 5826 inch^3; lime barrel contains 180 lb. av. or 280 lb. av.; by custom, flour barrel = 196 lb. av.
§ Variable.

United States.—*Cont'd.*

Unit	Gallon
1 gill (gi.)	= $\frac{1}{32}$
1 pint (pt.)	= $\frac{1}{8}$
1 quart (qt.)	= $\frac{1}{4}$
1 barrel*	= 31.5
1 hogshead	= 63

Uruguay.—m.e. 1894; m.o. 1866. Older = Spain (Castilian), more or less modified.

Venezuela.—m.e. 1914; m.o. 1857. Older = Spain (Castilian), more or less modified, and the following of Granada:

Length

1 vara	= 0.8 m
1 meile	= 6280 vara

Mass

1 libra	= 1 kg
1 bag	= 62.5 kg

Vereinigte Staaten *v.* United States.

Württemberg *v.* Germany

Yugoslavia. m.e. 1883 Older:

Length

1 linija	= 21.95 mm
1 palaz	= 36.34 mm
1 archine	= 660 mm to 712 mm
1 khvat	= 1.896 m
1 stopa	= $\frac{1}{6}$ kvat

Mass

1 oka = 1280 g

Unit	Oka
1 dramm	= $\frac{1}{400}$
1 satlijk	= $\frac{1}{4}$
1 litra	= $\frac{1}{4}$
1 akov	= 40
1 tovar	= 100

Area

1 stopa² = 998.56 cm²

Unit	m²
1 dunum	= 700
1 motyka	= 800
1 raliza	= 2500
1 dan oranja	= 3597
1 lanaz	5760 = 1600 khvat²

Capacity

(Liquids are measured by weight.)

C. SYSTEMS OF ANTIQUITY

Our knowledge of the measures of antiquity is derived from the texts and monuments which have persisted to modern times, and some actual standards which have come down to us. The latter enable us to establish quite exact equivalence between the measures which they represent and ours. But most frequently such equivalence is only very roughly known, or is actually unknown. In this section are given only the more important or the best studied of these systems. The values given must not be taken too literally. Indeed, especially in antiquity, systems do not succeed one another; they evolve. Several may coexist among a single people; it is generally impossible to fix the dates at which these systems were used. The ancients had no capacity measures, such as ours; they weighed liquids and grains in terms of standards forming a second system of weights.

Arabian System.

Length

1 foot = 0.320 m

Unit	Foot
1 assban (finger)	= $\frac{1}{16}$
1 cabda (palm)	= $\frac{1}{4}$
1 cubit (new)	$1\frac{1}{2}$
1 cubit†	= 2
1 orgye (pace)	= 6
1 qasab	= 12
1 seir	= 600
1 ghalva	= 720
1 mille	= 6000
1 parasang	= 18 000
1 barid	= 72 000
1 veredus	
1 marhala	= 144 000

Mass

(So-called system of the Prophet)

1 rotl = 340 g

Unit	Rotl
1 dirhem	= $\frac{1}{120}$
1 nevat	= $\frac{1}{24}$
1 nasch	= $\frac{1}{6}$
1 oukia	= $\frac{1}{3}$
1 man	= 2
1 mine	
1 oeque	= 4
1 qanthar	= 100
1 kikkar	= 125

Area

1 feddan = 14 400 cubit²†
= 59 a

Unit	Feddan
1 achir	= $\frac{1}{400}$
1 qasaba	
1 qamha	= $\frac{1}{96}$
1 habbah	= $\frac{1}{72}$
1 cafiz	= $\frac{1}{40}$
1 qirat	= $\frac{1}{24}$
1 daneq	= $\frac{1}{6}$
1 djarib	= $\frac{1}{4}$

Capacity

(Measured by weight)

1 cafiz = 32.64 kg

Unit	Cafiz
1 mudd	= $\frac{1}{48}$
1 kiladja	= $\frac{1}{24}$
1 caphite	
1 kist	
1 sâa	= $\frac{1}{12}$
1 makuk	= $\frac{1}{8}$
1 ferk	= $\frac{1}{4}$
1 woebe	= $\frac{1}{2}$
1 khoull	
1 modius	= $1\frac{1}{4}$
1 artabe	= 2
1 amphora	
1 gariba	= 8
1 den	

Assyro-Chaldean-Persian System.

Length

1 foot = 0.320 m

Unit	Foot
1 finger	= $\frac{1}{16}$
1 palm	= $\frac{1}{4}$
1 zereth	= 1
1 cubit	= 2
1 pace	= 6
1 qasab	= 12
1 cane	
1 chebel	= 80
1 stadion	= 720
1 ghalva	
1 mille	= 5400
1 parasang	= 20 000
1 schoeme	= 21 600
1 stathmos	= 80 000
1 mansion	

Mass

1 talent = 32.6 kg
(Talent divided into 50, 60 or 100 mina)
1 drachma = 0.01 mina

Area

1 gar = 14.7 m²
= 144 foot²

Unit	Gar
1 dizaine	= 10
1 gan	= 100
1 gur	= 1000

Capacity

(Measured by weight)

1 amphora = 32.6 kg

Unit	Amphora
1 cados	= $\frac{1}{32}$
1 makuk	= $\frac{1}{8}$
1 woebe	= $\frac{1}{2}$
1 modius	
1 small artaba	= $1\frac{1}{2}$
1 large artaba	= 2
1 large amphora	= 3
1 gariba	= 8

Egypt: System of the Pharaohs.

Length

1 pied = 0.349 m

Unit	Pied
1 doigt, finger	= $\frac{1}{16}$
1 theb	
1 palme	= $\frac{1}{4}$
1 choryos	
1 dichas	= $\frac{1}{2}$
1 spithame	= $\frac{3}{4}$
1 pied royal	= 1
1 zereth	
1 pigon	= $1\frac{1}{4}$
1 coudée royale	= $1\frac{1}{2}$
1 derah	
1 coudée longue	= 2
1 pas	= $2\frac{1}{3}$
1 xilon	= $4\frac{1}{2}$
1 orgye	= 6
1 canne	= $11\frac{2}{3}$
1 senus	= 150
1 stade	= 500 or 600
1 mille	= 5000
1 atour vulgaire	= 15 000
1 schoeme	= 18 000
1 parasange	= 20 000
1 atour royal	= 30 000

Mass

1 mine = 850 g

Unit	Mine
1 gerah	= $\frac{1}{1200}$
1 siele	= $\frac{1}{60}$
1 kikkar	= 50
1 talent	

Area

1 pekeis = 27.405 m²

Unit	Pekeis
1 coudée²	= $\frac{1}{100}$
1 sû	= 6.25
1 dizaine	= 10
1 rema	= 50
1 aurure	= 100
1 aroure	
1 setta	= 1000

---

* Wine barrel

† Hachemic.

Capacity

(Measured by weight)

1 khar = 34 kg

Unit	Khar
1 outen	= $\frac{1}{160}$
1 man 1 mine	= $\frac{1}{40}$
1 hecte	= $\frac{1}{16}$
1 apt	= $\frac{1}{4}$
1 keramion	= 1
1 metretes d'Héron	= $1\frac{1}{4}$
1 artabe des septante	= $1\frac{1}{2}$
1 artabe 1 letech	= $4\frac{7}{32}$

Greek System.

Length

1 pous* = 0.308 56 m

Unit	Pous
1 daktylos (finger)	= $\frac{1}{16}$
1 condylos	= $\frac{1}{8}$
1 palestra (palm)	= $\frac{1}{4}$
1 dichas	= $\frac{1}{2}$
1 spithame (span)	= $\frac{3}{4}$
1 cubit†	= $1\frac{1}{2}$
1 Grecian cubit	= 2
1 bema (pace)	= $2\frac{1}{2}$
1 orgyia	= 6
1 amma (corde)	= 60
1 plethron	= 100
1 stadion	= 600
1 mille	= 4500
1 kiloorgyia	= 6000

Mass

1 mina = 425 g

Unit	Mina
1 chalque	= $\frac{1}{4800}$
1 obol	= $\frac{1}{600}$
1 diobol	= $\frac{1}{300}$
1 drachma	= 0.01
1 tetradrachma	= 0.04
1 talent	= 60

Area

1 pous^2 = 0.095 209 m^2

Unit	Pous^2
1 dekapode^2	= 100
1 plethron^2	= 10 000

Capacity

(Measured by weight)

1 chenica = 816 g

Unit	Chenica
1 cyanthos	= $\frac{1}{24}$
1 oxybaphon	= $\frac{1}{16}$
1 cotyle	= $\frac{1}{4}$
1 sexte	= $\frac{1}{2}$
1 maris	= 2
1 choûs	= 3
1 hemiektos	= 4
1 hektos 1 modius	= 8
1 metretes	= 36
1 medimnos	= 48

Hebrew System.

Length

1 sacred cubit = 0.640 m

1 cubit* = 0.555 m

Unit	Cubit*
1 finger	= $\frac{1}{24}$
1 palm	= $\frac{1}{6}$
1 zereth	= $\frac{1}{2}$

Mass (Sacred system)

1 mina = 850 g

Unit	Mina
1 obol 1 gerah	= $\frac{1}{1200}$
1 rabah	= $\frac{1}{240}$
1 bekah	= $\frac{1}{120}$
1 shekel	= $\frac{1}{60}$
1 talent†	= 50

Mass (Talmudist or Rabbinical system)

1 mina = 354.2 g

Unit	Mina
1 pondiuscule	= $\frac{1}{1200}$
1 mehah 1 gerah 1 obol	= $\frac{1}{600}$
1 zuzah 1 drachma	= $\frac{1}{100}$
1 shekel 1 tetradrachma	= $\frac{1}{25}$
1 talent	= 60

Capacity, dry

(Measured by weight)

1 ephah (old) = 29.376 kg

1 ephah (new) = 21.420 kg

Unit	Ephah
1 log	= $\frac{1}{72}$
1 cab	= $\frac{1}{18}$
1 gomor	= 0.1
1 sath 1 modius	0.3
1 cor	= 10

Capacity, liquid

(Measured by weight)

1 bath (old) = 29.376 kg

1 bath (new) = 21.420 kg

Unit	Bath
1 log	= $\frac{1}{72}$
1 hin	= $\frac{1}{6}$
1 cor	= 10

Hindu System.

Length

1 hasta = 0.457 m

Unit	Hasta
1 angula (finger)	= $\frac{1}{24}$
1 vitasti (span)	= $\frac{1}{2}$
1 cubit	= 1
1 dhanush 1 orgyla	4
1 crosa	= 8000
1 gavyuti	= 16 000
1 yodjana	= 32 000

Mass

1 retti, 1 ratica = 0.147 g

1 pala = 47 g

Unit	Retti
1 yava	= 0.1
1 masha	= 2, 5, 6, or 8
1 tank-sala	= 24
1 kona	= 48
1 tola	80
1 karsha	= 96
1 dharana	= 32 (silver) 3200 (gold)
1 pala	= 320

Unit	Pala
1 tuba	= 100
1 hara	= 200
1 bara	= 2000
1 achita	= 20 000

Capacity

(Measured by weight)

1 drona = 13.2 kg

Unit	Drona
1 pala 1 musti	$\frac{1}{256}$
1 cudava	= $\frac{1}{32}$
1 prastha	= $\frac{1}{16}$
1 adhaka	= $\frac{1}{4}$
1 cumbha (small)	= 2
1 shari	= 16
1 cumbha	= 20
1 baha	= 200

Persian System *v.* Assyro-Chaldean-Persian.

Roman System.

Length

1 pes (common or Drusian) (foot) = 0.3196 m

1 legal pes (1st) = 0.2962 m

1 legal pes (2nd) = 0.2967 m

Unit	Pes
1 digitus (finger)	= $\frac{1}{16}$
1 uncia (inch)	= $\frac{1}{12}$
1 cubitus (cubit)	= $1\frac{1}{2}$
1 passus (pace)	= 5
1 decempeda (perch)	= 10
1 actus (chain)	= 120
1 millarium (mile)	= 5000

Mass

1 podium = 326 g

Unit	Podium
1 scrupulus	= $\frac{1}{288}$
1 denier*	= $\frac{1}{96}$
1 denier†	= $\frac{1}{90}$
1 denarius	= $\frac{1}{84}$
1 solidus 1 sextula	= $\frac{1}{72}$
1 miliaresium	= $\frac{1}{60}$
1 siclum	= $\frac{1}{48}$
1 duella	= $\frac{1}{36}$
1 semuncia	= $\frac{1}{24}$
1 ounce	= $\frac{1}{12}$
1 mina	= $1\frac{2}{3}$
1 centumpodium	= 100

Area

1 common pes^2 = 0.102 14 m^2

1 legal pes^2 (1st) = 0.087 73 m^2

1 legal pes^2 (2nd) = 0.088 03 m^2

Unit	Pes^2
1 decempeda^2	= 100
1 actus (small)	400
1 clima	= 3600
1 versum	= 10 000
1 actus	= 14 400
1 jugerum	= 28 800
1 heredium	= 57 600
1 centuria	= 5 760 000
1 saltus	= 23 040 000

Capacity, dry

1 sextarius = 544 g

Unit	Sextarius
1 modius	= 16
1 quadrantal	= 48
1 pes^3‡ (of water)	= 48

Capacity, liquid

(Measured by weight)

1 sextarius, 1 sextus = 544 g

Unit	Sextarius
1 cyathus	= $\frac{1}{12}$
1 acetabulum	= $\frac{1}{8}$
1 quartus	= $\frac{1}{4}$
1 hemina	= $\frac{1}{2}$
1 congius	= 6
1 urna	= 24
1 amphora	= 48
1 culeus 1 dolium	= 960

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* The Olympic foot of Egyptian origin.

† Lapidary.

* Talmudist

† Of Moses.

* Silver

† Neronian.

‡ Legal pes (2).

SYMBOLS, BASIC CONSTANTS, CONVERSION DATA, DIMENSIONS, DEFINITIONS

Symbols and Abbreviations . . . 16
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Conversion Factors and Dimensional Formulae, N. ERNEST DORSEY 18
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BASES OF DATA CONTAINED IN I. C. T.

When many experts are cooperating in the assembling of data, it is essential that the same values for the fundamental constants and for the necessary conversion factors shall be employed by all. Consequently, at the very beginning of the work, the Editors compiled a set of accepted, or I. C. T., values for such constants and factors; and the Experts were instructed to base all their data upon these values. In the few cases in which it was not feasible to follow these instructions, the data were to be accompanied by a statement of the actual basis upon which they rest.

In compiling this list, and in choosing the accepted values of such of the quantities as were independently chosen, the Editors secured and utilized the advice of the United States Bureau of Standards, the National Physical Laboratory of Great Britain, and the Société Française de Physique. Acknowledgments are also due to Dr. F. E. Fowle, of the Smithsonian Institution, for his valued assistance in preparing the initial table of fundamental constants, and to Professors T. W. Richards and G. P. Baxter for their recommendations concerning the table of atomic weights.

The list so prepared comprised (1) a table of atomic weights (p. 43), (2) a set of nine basic constants (p. 17) (the estimated uncertainties were added at a later date), (3) twenty-one derived constants (computed directly from the nine basic constants), five conventional constants, and two experimental constants (p. 18) and (4) certain conversion factors selected from Tables 1 to 79 (p. 20–32). Although the accepted values were close approximations to the best values at that time available, it was not claimed that they were such best values.

SYMBOLS AND ABBREVIATIONS

Except as the contrary is definitely stated, the following symbols and abbreviations will always be used in the sense here indicated. Other symbols will be defined in the sections in which they are used. For those quantities which are included in the list of symbols approved by the International Association of Chemical Societies (*J*, **119**: 502; 21), the symbols so approved have, in general, been used; in some cases, this has necessitated the use of the same symbol to represent two distinct quantities; the context will serve to indicate which interpretation is correct. For explanations of the several technical terms, consult Selected Technical Terms, p. 34.

Å	Ångstrom unit
A.	Acre
A_n	Normal atmosphere
A_{45}	Atmosphere, 45° latitude
A	Atomic weight. Maximum work of a thermodynamic system
a	Are
(a)	Based on Int. ohm and Int ampere as defined by silver voltameter. (*See* Int. elec. units, p. 27)
abs.	Absolute
ap	Apothecaries
Av.	Average
av.	Avoirdupois
a	Van der Waal's pressure constant Capillary constant
BTU	British Thermal Unit
bbl	Barrel
bd.	Board
bu.	Bushel
b	Van der Waal's volume constant
C	Centigrade
CTU	Centigrade thermal unit
C	Concentration. Molecular heat
C_1, C_2	Radiation constants of black body. (*See* definition of black body)
C_J	Intensity coefficient. (*See* definition of black body)
C_p, C_v	Molecular heat at constant pressure, at constant volume
c	Velocity of light in vacuo
c	Carat. Centi-
ca	Candle
ca.	*circa* = about, approximately
cal	Calorie (gram)
cd.	Cord
cf.	*Confer* = compare
cgs	Centimeter-gram-second system of units
cgse	Cgs electrostatic system
cgsm	Cgs electromagnetic system
ch.	Chain
cm	Centimeter
cm^2	Square centimeter
cm^3	Cubic centimeter
c p.	Candle power
cu.	Cubic
cu ft.	Cubic foot
cwt.	Hundredweight
c	Specific heat = heat capacity of the substance
c_p, c_v	Specific heat at constant pressure, at constant volume
D	Density
d	Derivative. Deci-
da	Day
deg	Thermometric degree, absolute C unless contrary is indicated
dk	Deka-
dm^3	Cubic decimeter
dr	Dram
dwt	Pennyweight
d	Density. Diameter
d_c	Critical density
$d^{t_2}_{t_1}$	Specific gravity at temperature t_2, with reference to water at temperature t_1
E	Electromotive force
E_0	Mean translational energy of molecule of ideal gas at 0°C
e	Electronic charge
e	Base of natural system of logarithms = 2 71828+
e.g	*Exempli gratia* = for example
em	Cgsm unit of quantity of electricity
emf	Electromotive force
equiv	Electrochemical equivalent
es	Cgse unit of quantity of electricity
etc.	*Et cetera* = and so forth
et seq	*Et sequentes* = and the following
ϵ_0	Ratio of E_0 to T_0
F	Faraday
F	Fahrenheit
fath.	Fathom
fir.	Firkin
fl.	Fluid
fps	Foot-pound-second system of units
fpse	Fps electrostatic system
fpsm	Fps electromagnetic system
ft.	Foot
$ft.^2$	Square foot
$ft.^3$	Cubic foot
fur.	Furlong
G	Gravitation constant
g	Gram
gal.	Gallon
gi.	Gill
gr.	Grain
g	Acceleration due to gravity
g_n	Standard gravity
HP	Horse-power
H	Atomic weight of hydrogen
h	Planck's constant of action
h	Hecto-
ha	Hectare
hhd.	Hogshead
h p.	Horse-power
hr	Hour
h	Height
Int.	International
I. C. T.	International Critical Tables
I	Electric current
ibid.	*Ibidem* = in the same place
i.e.	*Id est* = that is
in.	Inch
$in.^3$	Cubic inch
J	Radiance
J_λ	Intensity of monochromatic radiance of wave-length λ
J_m	Value of J_λ for $\lambda = \lambda_m$
K	Karat. Kelvin, or absolute C, scale of temperature
K	Constant of chemical equilibrium
k	Kilo-
kg	Kilogram
km	Kilometer
km^2	Square kilometer
k	Velocity coefficient of chemical reaction
k_0	Boltzmann's gas constant
L	Latent heat per mole
l	Liter
l.	Long
lat.	Latitude
lb.	Pound
li.	Link
liq.	Liquid
long.	Longitude
l	Length. Latent heat pe gram
M	Molecular weight
$M[\alpha]$	Molecular rotatory power
$M[\omega]$	Molecular magnetic rotatory power
m_0	Mass of electron at lo velocity
m	Meter. Milli-
m^2	Square meter
max.	Maximum
mg	Milligram
mi.	Mile
min	Minute

min.	Minim, Minimum
ml	Milliliter
mmf	Magnetomotive force
mμ	Millimicron. Millimicro-
m	Mass
m_H	Mass of a hydrogen atom
N	Numeric
N_0	Avogadro's number
N_∞	Rydberg's universal series constant
n	Refractive index
n_a, n_k	Transport number for anion, kation
n_0	Loschmidt's number
O	Atomic weight of oxygen
oz.	Ounce
P	Pressure
pk	Peck
pt.	Pint
p	Pressure
p_c, p_r	Critical pressure, reduced pressure
Q	Quantity
q	Quintal
qt.	Quart
q.v.	*Quod vide* = which see
R	Réaumur
R	Gas constant per mole of ideal gas. Electrical resistance.
rd.	Rod
r	Radius
r_G	Specific refractivity (Gladstone and Dale)
r_L	Specific refraction (Lorentz and Lorenz)
r_1	Radius of first Bohr ring, hydrogen
S.E.	Siemens unit
S	Entropy
s	Stere
s.	Scruple
sec	Second (mean solar unless contrary is stated)
sh.	Short
sq	Square
sq ft.	Square foot
T_0	Ice point, absolute C
T	Temperature on absolute C scale
T_c	Critical temperature, absolute C
t	Metric ton
t.	Troy
tn.	Ton
t	Time. Temperature C (above ice point)
t_c	Critical temperature C (above ice point)
U. S.	United States of America
V	Volume
v_0	Volume per gram-mole of ideal gas at 0°C and A_n
v.	*Vide* = see
(v)	Based on Int. ohm and Int. volt as defined by standard cell. (*See* Int elec. units, p 27.)
v	Volume
v_c, v_r	Critical volume, reduced volume
W	Electrical resistance
wt.	Weight
w	Wien's displacement constant
yd.	Yard
yr	Year
Z	Atomic number
α	Degree of dissociation. Angle of optical rotation
$[\alpha]$	Specific rotatory power
β	Specific heat constant
γ	Surface tension. Ratio of c_p/c_v. Gamma (magnetic unit)
Δ	Diffusion coefficient
ϵ	Dielectric constant. Electrode potential
ϵ_h, ϵ_c	Electrode potential above that of normal hydrogen, of normal calomel, electrode
η	Viscosity
θ	Angle (plane). Temperature C above ice point
κ	Susceptibility (magnetic). Electrical (volume) conductivity
Λ	Equivalent conductivity (electrical)
λ	Wave-length. λ5890 = spectral line of wave-length = 5890Å
λ_m	Wave-length of maximum monochromatic radiance of black-body at stated temperature
μ	Permeability (magnetic). Micron, Micro-, Molecular conductivity (electrical)
$\mu\mu$	Micromicron. Micromicro-
ν	Frequency
ν_∞	Rydberg's fundamental frequency
π	Ratio of circumference of a circle to its diameter
σ	Stefan's constant (radiation)
φ	Fluidity. Angle
ψ	Luminous flux
Ω	Ohm
$[\Omega]$	Relative molecular magnetic rotatory power with reference to water
ω	Solid angle
$[\omega]$	Specific magnetic rotatory power
♏	Minim
℥	Apothecaries' ounce
ʒ	Apothecaries' dram
℈	Apothecaries' scruple
°	Degree (arc or temperature)
′	Minute of arc (sexagesimal)
″	Second of arc (sexagesimal)
%	Percent = per hundred
‰	Per thousand = 0.1 %
[ ]	Dimensional expressions are inclosed in [ ]. In text, [ ] is used to inclose a second reading. (*E.g.*, Length [diameter] of the bar is 10 cm [1 cm] = length of bar is 10 cm, diameter of bar is 1 cm)
<	$A < B$ [$A > B$] denotes that A is less than [greater than] B
≮	Negative of <; $A \nless B$ denotes that A is not less than B
≤	Combination of < and =; $A \leq B$ denotes that A is equal to or less than, B
≠	Is not equal to
≡	Identically equal to; used in defining symbols, etc.
~	Approximately (or essentially) equal to
∞	Infinity

FUNDAMENTAL CONSTANTS

By an *accepted*, *conventional*, or *defined* value, is meant one which is to be regarded as exactly correct for purposes of computation.[1] Thus, errors from computational approximations are avoided and do not enter into consideration in any future revision of the computed result for a discovered difference between the true and the accepted value. When the computation involves several accepted values, it is especially important that each shall be regarded as exactly correct, for only then can the result be independently revised (without complete recalculation) for changes in the values of each. For this reason the logarithms of the several accepted values are given to the full precision of Vega's seven-place table. The degree of uncertainty in the value accepted is indicated by the number of significant figures retained in the value itself, not by the logarithm.

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[1] In every computation it is tacitly assumed that the values employed are exact. If but three digits are employed, it is assumed that all others are zero; if a computing machine is used, the assumption is carried out to the extreme limit of the machine; if logarithms are used, it is carried to the limit within which the logarithms are interpolated. To adopt an accepted or a conventional value, and to give as its logarithm an abbreviated value, is to introduce an ambiguity of a magnitude determined by the degree of abbreviation of the logarithm. But the sole object in adopting accepted or conventional values is to avoid ambiguity.

ACCEPTED BASIC CONSTANTS Units: cgs, °C, liter, A_n, absolute electric

	Quantity	Value	Uncertainty	$\log_{10}$ (value)
c	Velocity of light	2.9986 × 10^{10} cm sec^{-1}	0.0003	10.476 9185
G	Gravitation constant	6.66 × 10^{-8} cm^3 g^{-1} sec^{-2}	0.01	$\bar{8}$.823 4742
e	Electronic charge	4.774 × 10^{-10} es	0.005	$\bar{10}$.678 8824
e	Electronic charge	*1.592 × 10^{-20} em	.	$\bar{20}$.201 9639
e/m_0	Electronic ratio	5.305 × 10^{17} es g^{-1}	0.010	17.724 6854
e/m_0	Electronic ratio	*1.769 × 10^{7} emg^{-1}	..	7.247 7669
F	Faraday	9.6500 × 10^{4} coulombs	0.0010	4.984 5273
F	Faraday	*2.893 65 × 10^{14} es	....	14.461 4458
v_0	Volume 1 mole at 0°C, A_n	†22.4115 × 10^{3} cm^3 mole^{-1}	0.002	4.350 4709
h	Planck's constant	6.554 × 10^{-27} erg sec	0.001	$\bar{27}$.816 5064
T_0	Ice point, absolute	273.1 deg C	+0.15 to −0.05	2.436 3217
O	Atomic weight of oxygen	16.000 (by definition)	(definition)	1.204 1200

* This value is derived from the preceding one, which is the value actually accepted.

† Derived from volume at 0°C, A_{45} = 22.412 liters/g-mole on assumption $\log_{10}$ (A_n/A_{45}) = 0.000 0214, liter = 1000.027 cm^3.

ACCEPTED CONSTANTS:—CONVENTIONAL AND NON-BASIC Units: cgs, °C, liter, A_n absolute electric, international angstrom

Quantity	Value	Log_{10} (value)
	A. Derived Constants	
R Gas constant	8 315 × 10^7 erg deg^{-1} mole^{-1}	7.919 8658
R Gas constant ..	0 082 06 liter atm deg^{-1} mole^{-1}	$\bar{2}.914\ 1375$
R Gas constant	1 9869 cal_{15} deg^{-1} mole^{-1}	0.298 1703
N_0 Avogadro's number	6 061 × 10^{23} mole^{-1}	23.782 5634
n_0 Loschmidt's number ..	2 705 × 10^{19} cm^{-3} (at 0°C, A_n)	19.432 0925
k_0 Molecular gas constant ..	1 372 × 10^{-16} erg deg^{-1}	$\overline{16}.137\ 3024$
E_0 Translational energy of molecules, 0°C	5 620 × 10^{-14} erg	$\overline{14}.749\ 7154$
e_0 Ratio of E_0 to T_0	2 058 × 10^{-16} erg deg^{-1}	$\overline{16}.313\ 3937$
m_H Mass of hydrogen atom	1.663 × 10^{-24} g	$\overline{24}.220\ 7679$
m_0 Electronic mass ..	8 999 × 10^{-28} g	$\overline{28}.954\ 1970$
r_1 Radius 1st Bohr ring of hydrogen	0.5305 × 10^{-8} cm	$\bar{9}.724\ 6912$
h/e Photo-electric constant	1 373 × 10^{-17} erg sec es^{-1}	$\overline{17}.137\ 6240$
h/e Photo-electric constant	*4.117 × 10^{-15} volt sec	$\overline{15}.614\ 5425$
hc/e Photo-electric constant	4 117 × 10^{-7} erg cm es^{-1}	$\bar{7}.614\ 5425$
hc/e Photo-electric constant	1 2344 × 10^4 volt Å	4.091 4610
β Specific heat constant	4 778 × 10^{-11} sec deg	$\overline{11}.679\ 2040$
σ Stefan's constant	5 709 × 10^{-5} erg cm^{-2} sec^{-1} deg^{-4}	$\bar{5}.756\ 5416$
C_1 Radiation constant, first	3 703 × 10^{-5} erg cm^2 sec^{-1}	$\bar{5}.568\ 5233$
C_2 Radiation constant, second	1 433 cm deg	0.156 1225
w Wien's displacement constant	0 2885 cm deg	$\bar{1}.460\ 1933$
C_j Intensity coefficient	1 301 × 10^{-4} erg cm^{-3} sec^{-1} deg^{-5}	$\bar{4}.114\ 2762$
ν_∞ Rydberg frequency ..	3 2775 × 10^{15} sec^{-1}	15.515 5372
N_∞ Rydberg wave number	1 0930 × 10^5 cm^{-1}	5.038 6187
	B. Conventional Constants	
A_n Normal atmosphere	1 0132 50 × 10^6 dyne cm^{-2}	6 005 7166
A_{45} Atmosphere, latitude 45°	1 0132 00 × 10^6 dyne cm^{-2}	6.005 6952
Å Wave-length of red Cd line is	6438 4696 Å	4.808 7827
g_s Standard gravity ..	980 665 cm sec^{-2}	2 991 5207
Aberration constant	20 47″	1 311 1178
	C. Experimental Constants	
Grating space in calcite	3 028 Å	0.481 1559
H Atomic weight of hydrogen	1 0077	0.003 3313
‡Liter ...	1000 027 cm^3	3.000 0117
‡Gram calorie (20°C)	4.181 joule	0.621 2802
‡Gram calorie (15°C)..	4.185 joule	0.621 6955
‡Gram calorie (mean)	4.186 joule	0.621 7992
‡British Thermal Unit (39°F)	1060 4 joule	3.025 4697
‡British Thermal Unit (mean)	1054 8 joule	3 023 1701
‡British Thermal Unit (60°F)	1054.6 joule	3.023 0878
‡International ohm ..	1 000 52 ohm	0 000 2259
‡International ampere (v)§	0 999 90 ampere	0.999 9566
‡International ampere (a)§.	0 999 93 ampere	0 999 9696

* This value is derived from the preceding one, which is the value actually accepted.

‡ In the original list, this quantity was included solely in the list of conversion factors; its value, however, is an independently selected, *accepted* constant, and, consequently, is treated as exact in all computations

§ (v) = Based on Int ohm and Weston normal cell = 1 018300 Int volts at 20°C, (a) = based on deposit of 1 11800 mg of silver per Int ampere second.

CONVERSION FACTORS AND DIMENSIONAL FORMULAE

N. Ernest Dorsey

In the following tables are given the factors by which values expressed in other units must be multiplied in order to obtain their equivalents in units of the centimeter-gram-second (cgs) system. To convert in the reverse direction, divide by the factor given. The dimensional formula in the cgs, or any similarly constructed, system is given in the title of each table.

Conversion Factors.—With few exceptions,[1] the values given are based exclusively upon legal definitions, conventional constants, and the I. C. T. accepted values (p. 16). Consequently, they are computable to as extreme a precision as may be desired. They have been computed by means of Vega's seven-place logarithms, and it is hoped that their logarithms as given are correct to a unit in the last digit. Obviously, those factors which involve the accepted value of an experimentally determined constant will be in error by an amount determined by the error in the accepted value; but quantities converted by means of the logarithms given will retain their same relative precision, however great this may be, within the limit set by the seven-place table, and may at any time be as exactly corrected for a revision of the accepted value. This would not be true if an abbreviated logarithm were used, unless the exact value of the abbreviated logarithm itself were given. The latter would be equivalent merely to the adoption of another accepted value for the experimental constant involved;

---

[1] The exceptions are (1) astronomical unit of distance, (2) parsec, (3) sidereal second, (4) certain units of luminous intensity, (5) international electrical units prior to 1911, and (6) the data for hydrometers

and the new value so fixed would, in general, be expressible only by an indefinite number of digits. The former procedure is to be preferred.

Frequently, the same factor applies to more than one type of physical quantity; if the units of the several types have distinctive names, separate tables are given, otherwise, not. In general, the tables are arranged in the order of increasing complexity of the dimensional formulae. Some quantities for which conversion factors are seldom required, and a few dimensionless quantities have been grouped together in Table 78. The dimensional formulae of the more important electric and magnetic units, and the numerical relations connecting these units in the three systems most frequently used, are assembled in Table 77. To find the conversion factor for a given quantity, consult the index below.

Dimensions.—Two types of dimensional equations need to be considered, *viz.*: (1) Those in which the dimensions are expressed in terms of the quantities directly involved in the phenomenon under consideration, and (2) those in which the dimensions are expressed in terms of certain fundamental units.

As an illustration of the first we may consider the force of repulsion between two point charges (e, e') of electricity situated at a distance, r, apart in a medium of dielectric constant ϵ. If this force is denoted by f, then $f = ee'/\epsilon r^2$, and we may write $[e^2] = [f\epsilon l^2]$, $[\epsilon] = [e^2 f^{-1} l^{-2}]$, etc., where [ ] denotes that we are concerned with dimensions only; $[l]$ denotes the dimension of length, $[f]$ that of force, etc. These dimensional equations are true whatever be the system of units employed. As they involve quantities, such as force, which can be expressed in terms of other units that are usually considered more fundamental, such dimensional equations will be referred to as "unreduced," in order to distinguish them from those of the second class in which the dimensions are expressed solely in terms of a small number of fundamental units.

It is evident that the dimensions of a quantity in terms of fundamental units can be assigned only in relation to a specific system of units and to a specific method of derivation. For example, (1) if the unit of volume is defined as the volume occupied by a unit mass of water when at its greatest density under a pressure of one atmosphere, then the volume so defined will be independent of the units of length and time, and will vary directly as the unit of mass: we will have $[v] = [m]$. (2) If the unit of volume is defined as the volume occupied by a mass of water (when at its greatest density, etc.) which is equal to the mass of a specified block of platinum, then the volume so defined will not change as we change our units of length, of mass, and of time: that is $[v] = [v]$. In this case $[v]$ is an independent unit and must be so regarded in all dimensional equations. (3) If the unit of volume is defined as the volume of a cube of which the edge is equal to the unit of length then $[v] = [l^3]$. A unit may be defined in any desired unambiguous manner and, in general, the dimensions of the unit will vary from definition to definition.

Dimensional equations of the second type stand in marked contrast to those of the former, in being far less general and in implying the acceptance of a very exactly defined system of units. This, however, is the type of equation which is commonly in mind when dimensional equations are mentioned, and is probably the one which is the more generally useful; the unreduced dimensional expressions (the first type), however, are often simpler, convey more detailed information, and in many cases are to be preferred. For these reasons, unreduced dimensional expressions are to be found in explanations of technical terms (p. 34); they are followed by others, the final one in each case being the fully reduced dimensions on the centimeter, gram, second, degree centigrade absolute, electrostatic system. Wherever necessary, this system of units will be denoted by the symbol *cgse* in order to distinguish it from the corresponding electromagnetic system, which will be denoted by *cgsm*. In the conversion tables, dimensional formulae only of the cgse and of the cgsm systems are given. In the cgse system, the fundamental units and their symbols are those of length $[l]$ the centimeter, of mass $[m]$ the gram, of time $[t]$ the mean solar second, of temperature $[T]$ the absolute centigrade degree, and of dielectric constant $[\epsilon]$, that of a vacuum. The fundamental units in the cgsm system differ from those in the cgse system only by the replacement of dielectric constant by magnetic permeability $[\mu]$, the unit being the permeability of a vacuum.

It should be realized that dimensional expressions give no positive information regarding the ultimate nature of the quantity to which they refer; *e.g.*, energy and torque have the same dimensions, but differ vastly in their nature.

Symbols.—(U. S.) before a logarithm denotes that it is based upon the U. S. yard; for explanation of other symbols, see Symbols and Abbreviations, p. 16.

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CONVERSION FACTORS

1. Length [l] (*see also* p. 1)

Unit		Value	Log₁₀ (value)
1 angström unit	=	1.0000 $\times 10^{-8}$ cm	$\bar{8}.000\ 0000$
1 micron	=	1.0000 $\times 10^{-4}$ cm	$\bar{4}.000\ 0000$
1 mil	=	2.5400 $\times 10^{-3}$ cm	$\bar{3}.404\ 8346$
1 inch	=	2.5400 cm	(U. S.) 0.404 8346
1 foot	=	30.480 cm	(U. S.) 1.484 0158
1 yard (U. S.)	=	91.44018 cm	1.961 1371
1 yard (British)	=	91.43992 cm	1.961 1350
1 mile, statute	=	1.6093 km	(U. S.) 0.206 6497
1 light year	=	9.4627 $\times 10^{12}$ km	12.976 0131
1 astronomical unit	=	1.495 $\times 10^{8}$ km	8.174 6712
1 parsec	=	3.084 $\times 10^{13}$ km	13.489 09

2. Length⁻¹; Absorptivity; Coefficient of Absorption* [l^{-1}]

1 angstrom⁻¹	=	1.0000 $\times 10^{8}$ cm^{-1}	8.000 0000
1 micron⁻¹	=	1.0000 $\times 10^{4}$ cm^{-1}	4.000 0000
1 mil⁻¹	=	393.70 cm^{-1}	2.595 1654
1 inch⁻¹	=	0.39370 cm^{-1}	(U. S.) $\bar{1}.595\ 1654$
1 foot⁻¹	=	3.2808 $\times 10^{-2}$ cm^{-1}	(U. S.) $\bar{2}.515\ 9842$
1 mile⁻¹	=	0.62137 km^{-1}	$\bar{1}.793\ 3503$

* Coefficient of transmission (τ) is so defined that $-\log_e \tau$ = coefficient of absorption

3. Mass [m]; Weight (*see also* p. 1)

1 grain	=	64.799 mg	1.811 5677
1 carat (metric)	=	200.000 mg	2.301 0300
1 ounce (avoirdupois)	=	28.350 g	1.452 5458
1 ounce (apothecary) or (troy)	=	31.103 g	1.492 8090
1 pound (avoirdupois)	=	453.59243 g	2.656 6658
1 pound (apothecary) or (troy)	=	373.2417 g	2.571 9902
1 ton, short (2000 pounds)	=	907.185 kg	2.957 6958
1 ton, long (2240 pounds)	=	1016.047 kg	3.006 9138
1 slug (g_s)	=	14.594 kg	1.164 1707
1 gram mole	=	M. W.† g.	
1 molecule/M. W.†	=	1.6498 $\times 10^{-24}$ g	$\overline{24}.217\ 4366$
1 assay ton	=	29.1667 g	1.464 8868

† M. W. denotes the molecular weight of the substance

4. Mass⁻¹ [m^{-1}]

1 grain⁻¹	=	1.5432 $\times 10^{-2}$ mg^{-1}	2.188 4323
1 ounce⁻¹ (avoirdupois)	=	3.5274 $\times 10^{-2}$ g^{-1}	$\bar{2}.547\ 4542$
1 ounce⁻¹ (troy)	=	3.2151 $\times 10^{-2}$ g^{-1}	$\bar{2}.507\ 1910$
1 pound⁻¹ (avoirdupois)	=	2.2046 $\times 10^{-3}$ g^{-1}	$\bar{3}.343\ 3342$
1 ton⁻¹ (2000 pounds)	=	11.0231 $\times 10^{-4}$ kg^{-1}	$\bar{3}.042\ 3042$
1 ton⁻¹ (2240 pounds)	=	9.8421 $\times 10^{-4}$ kg^{-1}	$\bar{4}.993\ 0862$
1 (gram mole)⁻¹	=	†(M. W.)$^{-1}$ g^{-1}	

† M. W. denotes the molecular weight of the substance

5. Time [t]

1 second, mean solar	=	1.00273791 sidereal sec	0.001 1874
1 second, sidereal	=	0.997270 sec (mean solar)	$\bar{1}.998\ 8126$
1 hour (tropical, mean solar)	=	3.6000 $\times 10^{3}$ sec (mean solar)	3.556 3025
1 day (tropical, mean solar)	=	8.6400 $\times 10^{4}$ sec (mean solar)	4.936 5137
1 day (sidereal)	=	8.6164 $\times 10^{4}$ sec (mean solar)	4.935 3263
1 year (tropical, mean solar)	=	31.5569 $\times 10^{6}$ sec (mean solar)	7.499 0946
1 year (tropical, mean solar)	=	365.2422 day (mean solar)	2.562 5809

CONVERSION FACTORS.—*Continued*

6. Time^{-1}; Frequency; "Velocity" of a Process [t^{-1}]

1 second^{-1} (sidereal)	=	1.002738 sec^{-1} (mean solar)	0.001 1874
1 minute^{-1} (mean solar)	=	1.66667 $\times 10^{-2}$ sec^{-1} (mean solar)	$\bar{2}$.221 8487
1 hour^{-1} (mean solar)	=	2.77778 $\times 10^{-4}$ sec^{-1} (mean solar)	$\bar{4}$.443 6975
1 day^{-1} (mean solar)	=	1.15741 $\times 10^{-5}$ sec^{-1} (mean solar)	$\bar{5}$.063 4863
1 year^{-1} (mean solar)	=	3.16888 $\times 10^{-8}$ sec^{-1} (mean solar)	$\bar{8}$.500 9054
1 year^{-1} (mean solar)	=	2.73791 $\times 10^{-3}$ day^{-1} (mean solar)	$\bar{3}$.437 4191
1 electron-volt, quantum^{-1}	=	2.4292 $\times 10^{14}$ sec^{-1} (mean solar)	14.385 4575
1 joule per mole, N_0^{-1} quantum^{-1}	=	2.5173 $\times 10^{9}$ sec^{-1} (mean solar)	9.400 9301
1 velocity of light, (angström unit)$^{-1}$	=	2.9986 $\times 10^{18}$ sec^{-1} (mean solar)	18.476 9185
1 velocity of light, millimicron^{-1}	=	2.9986 $\times 10^{17}$ sec^{-1} (mean solar)	17.476 9185
1 velocity of light, micron^{-1}	=	2.9986 $\times 10^{14}$ sec^{-1} (mean solar)	14.476 9185
1 velocity of light, millimeter^{-1}	=	2.9986 $\times 10^{11}$ sec^{-1} (mean solar)	11.476 9185
1 velocity of light, meter^{-1}	=	2.9986 $\times 10^{8}$ sec^{-1} (mean solar)	8.476 9185

7. Angle [θ]

1 radian	=	57.29578 degree	1.758 1226
1 circumference	=	6.28319 radian	0.798 1799
1 quadrant	=	1.57080 radian	0.196 1199
1 degree	=	1.74533 $\times 10^{-2}$ radian	$\bar{2}$.241 8774
1 minute	=	2.90888 $\times 10^{-4}$ radian	$\bar{4}$.463 7261
1 second	=	4.84814 $\times 10^{-6}$ radian	$\bar{6}$.685 5749

8. Angle^{-1} [θ^{-1}]

1 circumference^{-1}	=	0.159155 radian^{-1}	$\bar{1}$.201 8201
1 degree^{-1}	=	57.29578 radian^{-1}	1.758 1226
1 minute^{-1}	=	3.43775 $\times 10^{3}$ radian^{-1}	3.536 2739
1 second^{-1}	=	2.06265 $\times 10^{5}$ radian^{-1}	5.314 4251

9. Solid Angle [ω]

Entire space	=	12.5664 steradian	1.099 2099
1 hemisphere	=	6.2832 steradian	0.798 1799
1 square degree	=	3.0462 $\times 10^{-4}$ steradian	$\bar{4}$.483 7548

10. Solid Angle^{-1} [ω^{-1}]

Entire space^{-1}	=	7.9577 $\times 10^{-2}$ steradian^{-1}	$\bar{2}$.900 7901
1 hemisphere^{-1}	=	1.5916 $\times 10^{-1}$ steradian^{-1}	$\bar{1}$.201 8201
1 square degree^{-1}	=	3.2828 $\times 10^{3}$ steradian^{-1}	3.516 2452

11. Temperature [T] (*See also* Thermometry, p. 52)

Fahrenheit. . . . $x°$ F $= (\frac{5}{9})(x - 32)°C$

Réaumur. . . . . $x°$ R $= (\frac{5}{4})x°C$

Absolute (Centigrade). . . . . $x°$ K $= (x - T_0)°C$

Absolute (Fahrenheit). . . . . $x°$ Rankine $= (\frac{5}{9})(x - 491.58)°C$

12. Degree^{-1} (Thermometric); Expansivity; Curie's Constant (magnetic) [T^{-1}]

1 per degree F	=	1.8000 per degree C	0.255 2725
1 per degree R	=	0.8000 per degree C	1.903 0900
1 per degree K	=	1.000 per degree C	0.000 0000

13. Luminous Flux [ψ]

By definition, the total luminous flux emitted by a point source of one spherical candle power is 4π *lumen*.

14. Dielectric Constant; Electrical Inductivity [ϵ]; [$\mu^{-1}l^{-2}t^2$]

Specific inductive capacity is of zero dimensions. It is numerically equal to the dielectric constant expressed in cgse or in fpse units.

1 cgsm unit	=	8.9916 $\times 10^{20}$ cgse unit	20.953 8370
1 fpse unit	=	1.0000 cgse unit	0.000 0000
1 fpsm unit	=	1.0764 $\times 10^{-3}$ cgsm unit	$\bar{3}$.031 9684
1 fpsm unit	=	9.6784 $\times 10^{17}$ cgse unit	17.985 8054

15. Magnetic Permeability; Susceptibility [$\epsilon^{-1}l^{-2}t^2$]; [μ]

1 cgse unit	=	8.9916 $\times 10^{20}$ cgsm unit	20.953 8370
1 fpsm unit	=	1.0000 cgsm unit	0.000 0000
1 fpse unit	=	1.0764 $\times 10^{-3}$ cgse unit	$\bar{3}$.031 9684
1 fpse unit	=	9.6784 $\times 10^{17}$ cgsm unit	17.985 8054

CONVERSION FACTORS.—*Continued*

16. Area $[l^2]$

1 circular millimeter	=	7.8540×10^{-3} cm^2	$\bar{3}.895\ 0899$
1 circular mil	=	5.0671×10^{-6} cm^2	(U. S.) $\bar{6}.704\ 7591$
1 square inch	=	6.4516 cm^2	(U. S.) $0.809\ 6692$
1 square foot	=	9.2903×10^{2} cm^2	(U. S.) $2.968\ 0316$
1 square yard	=	8.3613×10^{3} cm^2	(U. S.) $3.922\ 2742$
1 square mile	=	2.5900 km^2	(U. S.) $0.413\ 2995$
1 are	=	1.0000×10^{2} m^2	$2.000\ 0000$
1 hectare	=	1.0000×10^{4} m^2	$4.000\ 0000$
1 acre	=	4.0469×10^{3} m^2	$3.607\ 1196$

17. Area^{-1} $[l^{-2}]$

1 (circular millimeter)$^{-1}$	=	127.324 cm^{-2}	$2.104\ 9101$
1 millimeter^{-2}	=	100.0000 cm^{-2}	$2.000\ 0000$
1 meter^{-2}	=	0.0001 cm^{-2}	$\bar{4}.000\ 0000$
1 (circular mil)$^{-1}$	=	1.9735×10^{5} cm^{-2}	(U. S.) $5.295\ 2409$
1 inch^{-2}	=	0.15500 cm^{-2}	(U. S.) $\bar{1}.190\ 3308$
1 foot^{-2}	=	1.0764×10^{-3} cm^{-2}	(U. S.) $\bar{3}.031\ 9684$
1 yard^{-2}	=	1.19599×10^{-4} cm^{-2}	(U. S.) $\bar{4}.077\ 7258$
1 mile^{-2}	=	0.38610 km^{-2}	(U. S.) $\bar{1}.586\ 7005$

18. Volume $[l^3]$ or $[v]$

1 liter	=	1000.027 cm^3	$3.000\ 0117$
1 cubic inch	=	16.387 cm^3	(U. S.) $1.214\ 5038$
1 cubic foot	=	2.8317×10^{4} cm^3	(U. S.) $4.452\ 0474$
1 cubic yard	=	7.6456×10^{5} cm^3	(U. S.) $5.883\ 4112$
1 gallon (U. S.)	=	3.7854×10^{3} cm^3	$3.578\ 1157$
1 gallon (British)	=	4.5461×10^{3} cm^3	$3.657\ 6376$
1 bushel (U. S.)	=	3.5239×10^{4} cm^3	$4.547\ 0271$
1 bushel (British)	=	3.6369×10^{4} cm^3	$4.560\ 7276$
1 quart, dry (U. S.)	=	1101.23 cm^3	$3.041\ 8771$
1 quart, liquid (U. S.)	=	946.358 cm^3	$2.976\ 0557$
1 quart (British)	=	1136.521 cm^3	$3.055\ 5776$
1 fluid ounce (U. S.)	=	29.5737 cm^3	$1.470\ 9057$
1 fluid ounce (British)	=	28.4130 cm^3	$1.453\ 5176$

19. Volume^{-1} $[l^{-3}]$ or $[v^{-1}]$

1 liter^{-1}	=	9.9997×10^{-4} cm^{-3}	$4.999\ 9883$
1 inch^{-3}	=	6.1023×10^{-2} cm^{-3}	(U. S.) $\bar{2}.785\ 4962$
1 foot^{-3}	=	3.5314×10^{-5} cm^{-3}	(U. S.) $5.547\ 9526$
1 yard^{-3}	=	1.3079 m^{-3}	(U. S.) $0.116\ 5888$
1 gallon^{-1} (U. S.)	=	2.6417×10^{-4} cm^{-3}	$\bar{4}.421\ 8843$
1 gallon^{-1} (British)	=	2.1997×10^{-4} cm^{-3}	$\bar{4}.342\ 3624$
1 quart^{-1}, dry (U. S.)	=	9.0808×10^{-4} cm^{-3}	$\bar{4}.958\ 1229$
1 quart^{-1}, liquid (U. S.)	=	1.0567×10^{-3} cm^{-3}	$\bar{3}.023\ 9443$
1 quart^{-1} (British)	=	8.7988×10^{-4} cm^{-3}	$\bar{4}.944\ 4224$
1 (fluid ounce)$^{-1}$ (U. S.)	=	3.3814×10^{-2} cm^{-3}	$\bar{2}.529\ 0943$
1 (fluid ounce)$^{-1}$ (British)	=	3.5195×10^{-2} cm^{-3}	$\bar{2}.546\ 4824$

20. Length Degree^{-1} $[lT^{-1}]$

1 inch per °F	=	4.5720 cm per °C	$0.660\ 1071$
1 foot per °F	=	54.864 cm per °C	$1.739\ 2883$
1 meter per °C	=	100.00 cm per °C	$2.000\ 0000$

21. Mass^{-1} Degree^{-1} $[m^{-1}T^{-1}]$

1 per gram °F	=	1.8000 per gram °C	$0.255\ 2725$
1 per pound °F	=	3.9683×10^{-3} per gram °C	$\bar{3}.598\ 6067$
1 per pound °C	=	2.2046×10^{-3} per gram °C	$\bar{3}.343\ 3342$

22. Area^{-1} Time^{-1} $[l^{-2}t^{-1}]$

1 foot^{-2} second^{-1}	=	3.8750 cm^{-2} hr^{-1}	(U. S.) $0.588\ 2709$
1 foot^{-2} second^{-1}	=	1.0764×10^{-3} cm^{-2} sec^{-1}	(U. S.) $\bar{3}.031\ 9684$
1 mile^{-2} second^{-1}	=	1.2184×10^{-3} cm^{-2} yr^{-1}	(U. S.) $\bar{3}.085\ 7951$
1 meter^{-2} second^{-1}	=	3.600×10^{-1} cm^{-2} hr^{-1}	$\bar{1}.556\ 3025$

CONVERSION FACTORS.—*Continued*

23. Velocity [lt^{-1}]

1 foot per second	=	30.4801 cm sec^{-1}	(U. S.) 1.484 0158
1 foot per minute	=	0.5080 cm sec^{-1}	(U. S.) $\bar{1}$.705 8645
1 mile per hour	=	44.7041 cm sec^{-1}	(U. S.) 1.650 3472
1 mile per minute	=	2.6822 × 10^{3} cm sec^{-1}	(U. S.) 3.428 4984
1 meter per minute	=	1.6667 cm sec^{-1}	0.221 8487
1 kilometer per hour	=	27.7778 cm sec^{-1}	1.443 6975
Velocity of light	=	2.9986 × 10^{10} cm sec^{-1}	10.476 9185

24. Acceleration [lt^{-2}]

1 foot per second^{2}	=	30.480 cm sec^{-2}	(U. S.) 1.484 0158
1 mile per hour second	=	44.704 cm sec^{-2}	(U. S.) 1.650 3472
1 mile per hour minute	=	0.74507 cm sec^{-2}	(U. S.) 1.872 1959
1 meter per second^{2}	=	100.000 cm sec^{-2}	2.000 0000
1 kilometer per hour second	=	27.778 cm sec^{-2}	1.443 6975
Gravity, standard	=	980.665 cm sec^{-2}	2.991 5207
Gravity, standard	=	32.174 ft sec^{-2}	(U. S.) 1.507 5049

25. Angular Velocity [θt^{-1}]

1 revolution per day	=	7.2722 × 10^{-5} radian sec^{-1}	5.861 6662
1 revolution per minute	=	1.0172 × 10^{-1} radian sec^{-1}	1.020 0286
1 revolution per second	=	6.2832 radian sec^{-1}	0.798 1799
1 degree per second	=	1.7453 × 10^{-2} radian sec^{-1}	2.241 8774

26. Angular Acceleration [θt^{-2}]

1 revolution per second^{2}	=	6.2832 radian sec^{-2}	0.798 1799
1 revolution per minute^{2}	=	1.7453 × 10^{-3} radian sec^{-2}	3.241 8773
1 revolution per minute second	=	0.10420 radian sec^{-2}	1.020 0286

27. Twist; Rotatory Power [θl^{-1}]

1 degree per inch	=	6.8714 × 10^{-3} radian cm^{-1}	(U. S.) 3.837 0428
1 degree per foot	=	5.7261 × 10^{-4} radian cm^{-1}	(U. S.) 4.757 8616
1 degree per centimeter	=	1.7453 × 10^{-2} radian cm^{-1}	2.241 8774
1 minute per centimeter	=	2.9089 × 10^{-4} radian cm^{-1}	4.463 7261

28. Density; Volume Concentration; Solubility (Non-gases) [ml^{-3}] or [mv^{-1}] (*See also* Hydrometer Tables, p. 31)

1 gram per milliliter*	=	0.999973 g cm^{-3}	1.999 9883
1 pound per inch^{3}	=	27.680 g cm^{-3}	(U. S.) 1.442 1621
1 pound per foot^{3}	=	0.016018 g cm^{-3}	(U. S.) 2.204 6183
1 pound per gallon (U. S.)	=	0.119826 g cm^{-3}	1.078 5502
1 pound per gallon (British)	=	0.099776 g cm^{-3}	2.999 0282
1 slug per foot^{3} (g_s)	=	0.5154 g cm^{-3}	(U. S.) 1.712 1233
Mercury† at 0°C	=	15.5951 g cm^{-3}	1.192 9882

* Numerically equal to specific gravity t° 4° † Internationally accepted conventional value to be used in expressing pressures in terms of columns of mercury.

29. Mass Concentration [$m_1m_2^{-1}$]

(This quantity involves two distinct units of mass; when the two units are the same, the concentration is called the "titer," or is denoted as a per cent.)

1 gram per ton (2000 pound)	=	1.1023 mg per kilogram	0.042 3042
1 gram per ton (2240 pound)	=	0.9812 mg per kilogram	$\bar{1}$.993 0862
1 milligram per assay ton	=	*34.286 mg per kilogram	1.535 1132
1 ounce (av.) per ton (2000 lb.)	=	31.2500 mg per kilogram	1.494 8500
1 ounce (av.) per ton (2240 lb.)	=	27.9018 mg per kilogram	1.445 6320
1 pound (av.) per ton (2000 lb.)	=	500.000 mg per kilogram	2.698 9700
1 pound (av.) per ton (2240 lb.)	=	446.429 mg per kilogram	2.649 7520
1 gram per ton (metric)	=	1.0000 mg per kilogram	0.000 0000
1 karat†	=	41.667 mg per gram	1.619 7888

* Equals one troy ounce per 2000 lb. av † 1 of gold to 24 of mixture

30. Force [mlt^{-2}]

1 gram weight (g_s)	=	980.665 dyne	2.991 5207
1 poundal	=	1.3825 × 10^{4} dyne	(U. S.) 4.140 6816
1 pound weight (g_s)	=	4.4482 × 10^{5} dyne	5.648 1864
1 ton weight (2000 lb.) (g_s)	=	8.8964 × 10^{8} dyne	8.949 2164
1 ton weight (2240 lb.) (g_s)	=	9.9640 × 10^{8} dyne	8.998 4344

CONVERSION FACTORS.—*Continued*

31. Force^{-1} [$m^{-1}l^{-1}t^2$]

1 (gram weight)$^{-1}$ (*g.*)	=	1.0917×10^{-3} dyne^{-1}	$\bar{3}$.008 4793
1 poundal^{-1}	=	7.2330×10^{-5} dyne^{-1}	$\bar{5}$.859 3184
1 (pound weight)$^{-1}$ (*g.*)	=	2.2481×10^{-6} dyne^{-1}	$\bar{6}$.351 8136

32. Torque; Moment of a Force [ml^2t^{-2}]

1 pound-foot (*g.*)	=	1.3558×10^{7} dyne cm	(U. S.) 7.132 2022
1 pound-inch (*g.*)	=	1.1298×10^{6} dyne cm	(U. S.) 6.053 0210
1 kilogram-meter (*g.*)	=	9.8066×10^{7} dyne cm	7.991 5207
1 poundal-foot	=	4.2140×10^{5} dyne cm	(U. S.) 5.624 6974

33. Stress; Pressure; Tension; Young's Modulus; Modulus of Rigidity; Modulus of Compression; Bulk Modulus; Coefficient of Skin Friction [$ml^{-1}t^{-2}$]

1 barye	=	1.0000 dyne cm^{-2}	0.000 0000
1 bar	=	*1.0000×10^{6} dyne cm^{-2}	6.000 0000
1 gram weight per cm^2 (*g.*)	=	980.665 dyne cm^{-2}	2.991 5207
1 kilogram weight per m^2 (*g.*)	=	98.0665 dyne cm^{-2}	1.991 5207
1 kilogram weight per mm^2 (*g.*)	=	9.8066×10^{7} dyne cm^{-2}	7.991 5207
1 pound weight per in.^{2} (*g.*)	=	6.8947×10^{4} dyne cm^{-2}	(U. S.) 4.838 5173
1 pound weight per ft.^{2} (*g.*)	=	4.7880×10^{2} dyne cm^{-2}	(U. S.) 2.680 1548
1 ton (2000 lb.) weight per in.^{2} (*g.*)	=	1.3789×10^{8} dyne cm^{-2}	(U. S.) 8.139 5473
1 ton (2240 lb.) weight per in.^{2} (*g.*)	=	1.5444×10^{8} dyne cm^{-2}	(U. S.) 8.188 7653
1 ton (2000 lb.) weight per ft.^{2} (*g.*)	=	9.5760×10^{5} dyne cm^{-2}	(U. S.) 5.981 1848
1 ton (2240 lb.) weight per ft.^{2} (*g.*)	=	10.7251×10^{5} dyne cm^{-2}	(U. S.) 6.030 4028
1 centimeter of water at 4°C (*g.*)	=	9.80638×10^{2} dyne cm^{-2}	2.991 5090
1 inch of water at 4°C (*g.*)	=	2.49082×10^{3} dyne cm^{-2}	(U. S.) 3.396 3436
1 centimeter of mercury at 0°C (*g.*)	=	1.33322×10^{4} dyne cm^{-2}	4.124 9031
1 inch of mercury at 0°C (*g.*)	=	3.38639×10^{4} dyne cm^{-2}	(U. S.) 4.529 7377
1 normal atmosphere (*g.*)	=	1.01325×10^{6} dyne cm^{-2}	6.005 7166

* This value accords with the only internationally accepted use of this term, but "bar" has also been used to denote a pressure of one dyne per cm^2.

34. Stress^{-1}; Compressibility [$m^{-1}lt^2$]

1 centimeter^2 per gram weight (*g.*)	=	1.0197×10^{-3} cm^2 dyne^{-1}	$\bar{3}$.008 4793
1 centimeter^2 per kilogram weight (*g.*)	=	1.0197×10^{-6} cm^2 dyne^{-1}	$\bar{6}$.008 4793
1 millimeter^2 per kilogram weight (*g.*)	=	1.0197×10^{-8} cm^2 dyne^{-1}	$\bar{8}$.008 4793
1 inch^2 per pound weight (*g.*)	=	1.4504×10^{-5} cm^2 dyne^{-1}	(U. S.) $\bar{5}$.161 4827
1 inch^2 per ton weight (2000 lb.) (*g.*)	=	7.2519×10^{-9} cm^2 dyne^{-1}	(U. S.) $\bar{9}$.860 4527
1 inch^2 per ton weight (2240 lb.) (*g.*)	=	6.4749×10^{-9} cm^2 dyne^{-1}	(U. S.) $\bar{9}$.811 2347
1 foot^2 per pound weight (*g.*)	=	2.0886×10^{-3} cm^2 dyne^{-1}	(U. S.) $\bar{3}$.319 8452
1 (centimeter of water at 4°C)$^{-1}$ (*g.*)	=	1.0197×10^{-3} cm^2 dyne^{-1}	$\bar{3}$.008 4910
1 (inch of water at 4°C)$^{-1}$ (*g.*)	=	4.0147×10^{-4} cm^2 dyne^{-1}	(U. S.) $\bar{4}$.603 6564
1 (centimeter of mercury at 0°C)$^{-1}$ (*g.*)	=	7.5006×10^{-5} cm^2 dyne^{-1}	$\bar{5}$.875 0969
1 (inch of mercury at 0°C)$^{-1}$ (*g.*)	=	2.9530×10^{-5} cm^2 dyne^{-1}	(U. S.) $\bar{5}$.470 2623
1 (normal atmosphere)$^{-1}$ (*g.*)	=	9.8692×10^{-7} cm^2 dyne^{-1}	$\bar{7}$.994 2831

35. Work; Energy; Heat [ml^2t^{-2}]

1 centimeter-dyne	=	1.0000 erg	0.000 0000
1 joule (absolute)	=	1.0000×10^{7} erg	7.000 0000
1 joule (International) (v)	=	1.00032 joule (abs.)	0.000 1390
1 meter-kilogram (*g.*)	=	9.80665 joule (abs.)	0.991 5207
1 foot-pound (*g.*)	=	1.35582 joule (abs.)	(U. S.) 0.132 2022
1 liter-atmosphere (normal) (*g.*)	=	101.328 joule (abs.)	2.005 7283
1 liter-atmosphere (45° lat.)	=	*101.323 joule (abs.)	2.005 7067
1 cubic centimeter-atmosphere (normal) (*g.*)	=	0.101325 joule (abs.)	$\bar{1}$.005 7166
1 horse-power hour (HP hr.) (*g.*)	=	2.6845×10^{6} joule (abs.)	(U. S.) 6.428 8674
1 horse-power hour (electrical, U. S., British)	=	2.6856×10^{6} joule (abs.)	6.429 0413
1 cheval-vapeur heure (*g.*)	=	2.6478×10^{6} joule (abs.)	6.422 8845
1 kilowatt-hour (abs.)	=	3.6000×10^{6} joule (abs.)	6.556 3025
1 International volt (v) faraday	=	9.6541×10^{4} joule (abs.)	4.984 7097
1 International volt (v) electronic charge	=	1.5927×10^{-19} joule (abs.)	$\overline{19}$.202 1463
1 gram calorie (20°C)	=	4.181 joule (abs.)	0.621 2802
1 gram calorie (15°C)	=	4.185 joule (abs.)	0.621 6955
1 gram calorie (mean)	=	4.186 joule (abs.)	0.621 7992
1 British Thermal Unit (39°F)	=	1060.4 joule (abs.)	3.025 4697
1 British Thermal Unit (mean)	=	1054.8 joule (abs.)	3.023 1701
1 British Thermal Unit (60°F)	=	1054.6 joule (abs.)	3.023 0878
1 Centigrade Thermal Unit (15°C)	=	1.8983×10^{3} joule (abs.)	3.278 3613

* $g_{45} = 980.616$ cm sec^{-2}.

CONVERSION FACTORS.—*Continued*

36. Power [ml^2t^{-3}]

1 watt (absolute)	=	1.0000×10^{7} erg sec^{-1}	7.000 0000
1 watt (International) (v)	=	1.00032 watt (abs.)	0.000 1390
1 meter-kilogram per second (g_s)	=	9.80665 watt (abs.)	0.991 5207
1 foot-pound per second (g_s)	=	1.35582 watt (abs.)	(U. S.) 0.132 2022
1 horsepower, electrical (U. S., British)	=	*746.00 watt (abs.)	2.872 7388
1 horsepower, electrical (Continental Europe)	=	*736.00 watt (abs.)	2.866 0778
1 horsepower (HP) (g_s)	=	†745.70 watt (abs.)	2.872 5649
1 cheval-vapeur (g_s)	=	735.499 watt (abs.)	2.866 5820

* Defined in terms of the watt, commonly used in rating electrical machinery. † Defined as 550 ft. lb per sec

37. Action [ml^2t^{-1}]

1 Planck's quantum	=	6.554×10^{-27} erg sec	$\overline{27}.816\ 5064$
1 volt electronic-charge second	=	2.4292×10^{14} quanta	14.385 4575
1 volt faraday second	=	1.4721×10^{38} quanta	38.168 0209
1 joule second	=	1.5258×10^{33} quanta	33.183 4936
1 calorie (15°C) second	=	6.3854×10^{33} quanta	33.805 1891
1 joule second/N_0*	=	2.5173×10^{9} quanta	9.400 9302
1 calorie (15°C) second/N_0*	=	1.0535×10^{10} quanta	10.022 6257

* N_0 denotes Avogadro's number, the number of molecules per gram mole

38. Fluidity [$m^{-1}lt$] (*See also* 39)

1 rhe	=	1.0000 poise^{-1}	0.000 0000

39. Viscosity [$ml^{-1}t^{-1}$]

1 poise	=	1.000 gram cm^{-1} sec^{-1}	0.000 0000
1 gram weight sec cm^{-2} (g_s)	=	980.665 poise	2.991 5207
1 pound weight sec inch^{-2} (g_s)	=	6.895×10^{4} poise	(U. S.) 4.838 5173
1 pound weight sec foot^{-2} (g_s)	=	4.788×10^{2} poise	(U. S.) 2.680 1548

40. Kinematic Viscosity [l^2t^{-1}]

1 poise centimeter^3 gram^{-1}	=	1.000 cm^2 sec^{-1}	0.000 0000
1 poise inch^3 gram^{-1}	=	16.387 cm^2 sec^{-1}	1.214 5038
1 inch^2 second^{-1}	=	6.451 cm^2 sec^{-1}	(U. S.) 0.809 6692
1 poise foot^3 pound^{-1}	=	62.43 cm^2 sec^{-1}	(U. S.) 1.795 3817

41. Diffusivity; Diffusion, Coefficient of [l^2t^{-1}]

All quantities of the thing diffusing are to be expressed in terms of the same units. Heat diffusivity is numerically equal to heat conductivity divided by the product of the density times the heat capacity (per unit of mass); all must be expressed in the same system of units.

1 liter centimeter^{-1} day^{-1}	=	1.1574×10^{-2} cm^2 sec^{-1}	$\bar{2}.063\ 4980$
1 centimeter^2 day^{-1}	=	1.1574×10^{-5} cm^2 sec^{-1}	$\bar{5}.063\ 4863$
1 inch^2 sec^{-1}	=	6.4516 cm^2 sec^{-1}	(U. S.) 0.809 6692

42. Surface Tension [mt^{-2}] (*See also* Capillary Constant, Table 43)

1 milligram weight per mm (g_s)	=	9.80665 dyne cm^{-1}	0.991 5207
1 milligram weight per inch (g_s)	=	0.38609 dyne cm^{-1}	(U. S.) $\bar{1}.586\ 6861$
1 erg per centimeter^2	=	1.00000 dyne cm^{-1}	0.000 0000
1 erg per millimeter^2	=	100.00000 dyne cm^{-1}	2.000 0000

43. (Capillary Constant)^2 [l^2]

The term "Capillary Constant" is used in two different senses; *viz*., either to denote $a_1 = \sqrt{\gamma/\rho g}$, or to denote $a_2 = \sqrt{2\gamma/\rho g}$. English authors generally follow the former practice, and German authors the latter; neither use the subscript. γ denotes the surface tension, g the acceleration of gravity, and ρ the positive difference in the densities of the adjacent fluids

1 inch^2	=	6.451 cm^2	0.809 6692
1 millimeter^2 (a_1^2) (g_s)	=	*9.807 dyne cm^{-1} per (g cm^{-3})	0.991 5207
1 millimeter^2 (a_2^2) (g_s)	=	*4.903 dyne cm^{-1} per (g cm^{-3})	0.690 4907
1 inch^2 (a_1^2) (g_s)	=	*6.327×10^{3} dyne cm^{-1} per (g cm^{-3})	(U. S.) 3.801 1899
1 inch^2 (a_2^2) (g_s)	=	*3.163×10^{3} dyne cm^{-1} per (g cm^{-3})	(U. S.) 3.500 1599

* To convert a^2, when referred to g_s, to surface tension in dynes per cm, multiply a^2 by the factor given in this table and by the difference in the densities (gram per cm^3) of the adjacent fluids, if a^2 is referred to g, multiply the resulting product by g/g_s

44. Thermal Conductivity [$T^{-1}mlt^{-3}$]

The dimensions practically employed in expressing this property are (Heat Area^{-1} Time^{-1} per Degree Length^{-1}). Other conversion factors may be obtained by combining those of Tables 35 (Heat), 22 (Area^{-1} Time^{-1}) and 20 (Length Degree^{-1}).

1 calorie (15°) cm^{-2} sec^{-1} (°C, cm^{-1})$^{-1}$	=	4.185 joules (abs.) cm^{-2} sec^{-1} (°C, cm^{-1})$^{-1}$	0.621 6955
1 calorie (20°) cm^{-2} sec^{-1} (°C, cm^{-1})$^{-1}$	=	4.181 joules (abs.) cm^{-2} sec^{-1} (°C, cm^{-1})$^{-1}$	0.621 2802

CONVERSION FACTORS.—*Continued*

44. Thermal Conductivity [$T^{-1}mlt^{-3}$].—*Continued*

1 British Thermal Unit (39°F) ft.$^{-2}$ sec^{-1} (°F, in.$^{-1}$)$^{-1}$	=	5.218 joules (abs.) cm^{-2} sec^{-1} (°C, cm^{-1})$^{-1}$	0.717 5452
1 British Thermal Unit (mean) ft.$^{-2}$ sec^{-1} (°F, in.$^{-1}$)$^{-1}$	=	5.191 joules (abs.) cm^{-2} sec^{-1} (°C, cm^{-1})$^{-1}$	0.715 2456
1 British Thermal Unit (60°F) ft.$^{-2}$ sec^{-1} (°F, in $^{-1}$)$^{-1}$	=	5 190 joules (abs.) cm^{-2} sec^{-1} (°C, cm^{-1})$^{-1}$	0 715 1633

45. Intensity of Radiation [ml^{-3}] or [$ml^{-1}t^{-2}$]

The dimensions depend upon the point of view, when the receptor is considered, they are [Energy, Area^{-1}, Time^{-1}]; when the radiation itself is considered *they are [Energy, Volume^{-1}] Conversion from one to the other involves the velocity of propagation, if this is the velocity of light in vacuo, the factors are as given below, if the velocity is v cm sec^{-1}, the factors given must be multiplied by v/(2 9986 × 10^{10})* For other units, combine these factors with those of Tables *19 (Volume^{-1}), 22 (Area^{-1} Time^{-1}), and 35 (Energy)*

1 erg cm^{-3}	=	2 9986 × 10^{10} erg cm^{-2} sec^{-1}	10 476 9185
1 foot-pound ft $^{-3}$ (*g.*)	=	1 4357 × 10^{13} erg cm^{-2} sec^{-1}	(U. S.) 13.157 0733

46. Luminous Intensity of a Source in a Given Direction [$\psi\omega^{-1}$]

By definition of the lumen, a source of one spherical candle power emits 4π(= 12 566) lumens. (*See also* Photometric Standards, in another section (consult index))

1 candle, International	=	1 0000 Int. lumen per steradian		0.000 0000
1 pentane candle	=	1 0 Int. candle	Approximate	
1 Hefner unit	=	0 9$_0$ Int. candle		
1 Carcel unit	=	9 6 Int. candle		
1 bougie decimale	=	1 0 Int. candle		
1 English sperm candle	=	1 0 Int. candle		

47. Illumination of a Surface [ψl^{-2}]

1 lux	=	1 000	lumen meter^{-2}	0 000 0000
1 meter-candle	=	1 000	lumen meter^{-2}	0 000 0000
1 phot	=	1 000 × 10^{4}	lumen meter^{-2}	4 000 0000
1 foot-candle	=	10 764	lumen meter^{-2}	(U. S.) 1 031 9684
1 lumen foot^{-2}	=	10 764	lumen meter^{-2}	(U. S.) 1 031 9684

48. Surface Brightness [$\psi l^{-2}\omega^{-1}$]

1 lumen centimeter^{-2} steradian^{-1}	=	1 0000	lambert	0 000 0000
1 lumen foot^{-2} steradian^{-1}	=	1 0764	millilambert	(U. S.) 0 031 9684
1 candle centimeter^{-2}	=	3 1416 × 10^{3}	millilambert	3 497 1499
1 candle inch^{-2}	=	4 8695 × 10^{2}	millilambert	(U S.) 2 687 4807

49. Electrical Quantity; Charge; Total Electric Displacement; Flux of Induction [$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-1}$]; [$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$]

1 absolute coulomb	=	1 00010	Int. coulomb (v)	0.000 0434
1 absolute coulomb		1 00007	Int. coulomb (a)	0 000 0304
1 International coulomb (v)	=	0 99990	abs. coulomb	$\bar{1}$.999 9566
1 International coulomb (a)	=	0 99993	abs. coulomb	1.999 9696
1 cgsm unit	=	10 0000	abs. coulomb	1.000 0000
1 cgsm unit	=	*2 9986 × 10^{10}	cgse unit	10 476 9185
1 cgse unit	=	3 3349 × 10^{-10}	abs. coulomb	$\bar{10}$.523 0815
1 fpsm unit	=	1 1758 × 10^{2}	cgsm unit	2 070 3408
1 fpse unit	=	3 5839 × 10^{3}	cgse unit	3.554 3566
1 fpse unit	=	1 1952 × 10^{-6}	abs. coulomb	6 077 4381
1 ampere-hour (abs.)	=	3 6000 × 10^{3}	abs. coulomb	3 556 3025
1 electronic charge	=	1 5921 × 10^{-19}	abs. coulomb	$\bar{19}$ 201 9639
1 electronic charge	=	4 774 × 10^{-10}	cgse unit	$\bar{10}$ 678 8824
1 faraday	=	9 6500 × 10^{4}	abs. coulomb	4 984 5273
1 faraday	=	9 6510 × 10^{4}	Int. coulomb (v)	4.984 5707
1 faraday	=	9 6507 × 10^{4}	Int. coulomb (a)	4.984 5577
1 faraday	=	2 89365 × 10^{14}	cgse unit	14 461 4458

* Value of **c**; experimental value = 2 9979 × 10^{10} (Rosa and Dorsey, *Bull. U. S. Bur. Standards*, **3**: 433, 07)

50. Electrical Quantity^{-1}; Charge^{-1}; Total Electric Displacement^{-1}; Flux of Induction^{-1} [$\epsilon^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{3}{2}}t$]; [$\mu^{\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}$]

1 absolute coulomb^{-1}	=	0 99990	Int. coulomb^{-1} (v)	1 999 9566
1 absolute coulomb^{-1}	=	0 99993	Int. coulomb^{-1} (a)	$\bar{1}$ 999 9696
1 cgsm unit^{-1}	=	0 1000	abs. coulomb^{-1}	$\bar{1}$.000 0000
1 cgse unit^{-1}	=	2 9986 × 10^{9}	abs. coulomb^{-1}	9 476 9185
1 ampere-hour^{-1}	=	2 7778 × 10^{-4}	abs. coulomb^{-1}	$\bar{4}$.443 6975
1 faraday^{-1}	=	1 0363 × 10^{-5}	abs. coulomb^{-1}	$\bar{5}$.015 4727
1 electronic charge^{-1}	=	6 281 × 10^{18}	abs. coulomb^{-1}	18 798 0361

CONVERSION FACTORS.—*Continued*

51. Electrical Current $[\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}]$; $[\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}]$

absolute ampere	=	1.00010	Int. ampere (v)	0.000 0434
absolute ampere	=	1.00007	Int. ampere (a)	0.000 0304
International ampere (v)	=	0.99990	abs. ampere	$\bar{1}$.999 9566
International ampere (a)	=	0.99993	abs. ampere	$\bar{1}$.999 9696
cgsm unit	=	10.0000	abs. ampere	1.000 0000
cgse unit	=	3.3349 × 10^{-10}	abs. ampere	$\overline{10}$.523 0815
faraday second^{-1}	=	9.6500 × 10^{4}	abs. ampere	4.984 5273
International ampere (U. S. before 1911)	=	0.99916	Int. ampere (v)	$\bar{1}$.999 6353
International ampere (England before 1906)	=	0.99870	Int. ampere (v)	$\bar{1}$.999 4358
International ampere (England 1906–8)	=	0.99894	Int. ampere (v)	$\bar{1}$.999 5399
International ampere (England 1909–10)	=	0.99990	Int. ampere (v)	$\bar{1}$.999 9566
International ampere (France before 1911)	=	0.9998	Int. ampere (v)	$\bar{1}$.999 9131
International ampere (Germany before 1911)	=	0.99968	Int. ampere (v)	$\bar{1}$.999 8610

52. Electrical Potential $[\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}]$; $[\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}]$

absolute volt	=	0.99958	Int. volt (v)	1.999 8176
absolute volt	=	0.99955	Int. volt (a)	$\bar{1}$.999 8046
International volt (v)	=	1.00042	abs. volt	0.000 1824
International volt (a)	=	1.00045	abs. volt	0.000 1954
cgsm unit	=	1.0000 × 10^{-8}	abs. volt	$\bar{8}$.000 0000
cgse unit	=	299.86	abs. volt	2.476 9185
International volt (U. S. before 1911)	=	0.99916	Int. volt (v)	$\bar{1}$.999 6353
International volt (England before 1906)	=	0.99870	Int. volt (v)	$\bar{1}$.999 4358
International volt (England 1906–8)	=	0.99894	Int. volt (v)	$\bar{1}$.999 5399
International volt (England 1909–10)	=	0.99990	Int. volt (v)	$\bar{1}$.999 9566
International volt (Germany and France, before 1911)	=	0.99968	Int. volt (v)	$\bar{1}$ 999 8610

53. Electrical Field Strength; Potential Gradient; Dielectric Strength $[\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}]$; $[\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}]$

1 cgsm centimeter^{-1}	=	1.0000 × 10^{-8}	abs. volt cm^{-1}	$\bar{8}$ 000 0000
1 cgsm inch^{-1}	=	3.9370 × 10^{-9}	abs. volt cm^{-1}	(U. S.) $\bar{9}$ 595 1654
1 cgse centimeter^{-1}	=	2.9986 × 10^{2}	abs. volt cm^{-1}	2.476 9185
1 cgse inch^{-1}	=	1.1805 × 10^{2}	abs. volt cm^{-1}	(U. S.) 2 072 0839
1 volt inch^{-1}	=	3.9370 × 10^{-1}	volt cm^{-1}	(U. S.) $\bar{1}$ 595 1654

54. Electrical Resistance; Surface Resistivity $[\epsilon^{-1}l^{-1}t]$; $[\mu l t^{-1}]$

1 absolute ohm	=	0.99948	Int. ohm	$\bar{1}$ 999 7741
1 International ohm	=	1.00052	abs. ohm	0.000 2259
1 cgsm unit	=	1.0000 × 10^{-9}	abs. ohm	$\bar{9}$.000 0000
1 cgse unit	=	8.9916 × 10^{11}	abs. ohm	11.953 8370
1 International ohm (France before 1911)	=	0.9999	Int. ohm	$\bar{1}$.999 9566
1 Board of Trade unit (England 1903)	=	0.99984	Int. ohm	$\bar{1}$.999 9306
1 B. A. unit	=	0.98660	Int. ohm	$\bar{1}$ 994 1420
1 "Legal ohm" of 1884 (England)	=	0.99718	Int. ohm	1 998 7727
1 Siemens unit	=	0.91073	Int. ohm	$\bar{1}$.973 4667

55. Electrical Inductance $[\epsilon^{-1}l^{-1}t^{2}]$; $[\mu l]$

1 absolute henry	=	0.99948	Int. henry	1 999 7741
1 International henry	=	1.00052	abs. henry	0.000 2259
1 cgsm unit*	=	1.0000 × 10^{-9}	abs. henry	9.000 0000
1 cgse unit	=	8.9916 × 10^{11}	abs. henry	11.953 8370

* Occasionally called a centimeter

56. Electrical Capacity $[\epsilon l]$; $[\mu^{-1}l^{-1}t^{2}]$

1 absolute farad	=	1.00052	Int. farad	0.000 2259
1 International farad	=	0.99948	abs. farad	$\bar{1}$.999 7741
1 cgsm unit	=	1.0000 × 10^{9}	abs. farad	9.000 0000
1 cgse unit*	=	1.1121 × 10^{-12}	abs. farad	$\overline{12}$.046 1630
1 cgsm unit	=	8.9916 × 10^{20}	cgse unit	20.953 8370
1 absolute farad	=	8.9916 × 10^{11}	cgse unit	11.953 8370

* Frequently called a centimeter

57. Electrical Volume Resistivity $[\epsilon^{-1}t]$; $[\mu l^{2}t^{-1}]$

1 absolute ohm-centimeter	=	0.99948	Int. ohm-cm	1.999 7741
1 International ohm-centimeter	=	1.00052	abs. ohm-cm	0.000 2259
1 cgsm unit	=	9.9948 × 10^{-10}	Int. ohm-cm	$\overline{10}$.999 7741
1 cgse unit	=	8.9869 × 10^{11}	Int. ohm-cm	11.953 6111

CONVERSION FACTORS.—*Continued*

57. Electrical Volume Resistivity $[\epsilon^{-1}t]$; $[\mu l^2 t^{-1}]$.—*Continued*

1 microhm-centimeter	=	1.0000 × 10^{-6}	ohm-cm		$\bar{6}.000\ 0000$
1 microhm-inch	=	2.5400	microhm-cm	(U. S.)	0.404 8346
1 ohm-inch	=	2.5400 × 10^{6}	microhm-cm	(U. S.)	6.404 8346
1 ohm (meter, millimeter^2)	=	100.0000	microhm-cm		2.000 0000
1 ohm (meter, millimeter)	=	78.540	microhm-cm		1.895 0899
1 ohm (mil, foot)	=	1.6624 × 10^{-1}	microhm-cm	(U. S.)	$\bar{1}.220\ 7433$
International Annealed Copper Standard (20°C)	=	1.7241	microhm-cm		0.236 5720

58. Volume Conductivity $[\epsilon t^{-1}]$; $[\mu^{-1}l^{-2}t]$

1 absolute *ohm^{-1}-centimeter^{-1}	=	1 00052	Int.* ohm^{-1} cm^{-1}		0.000 2259
1 International ohm^{-1}-centimeter^{-1}	=	0 99948	abs. ohm^{-1} cm^{-1}		$\bar{1}.999\ 7741$
1 cgsm unit	=	1 00052 × 10^{9}	Int. ohm^{-1} cm^{-1}		9.000 2259
1 cgse unit	=	1.11273 × 10^{-12}	Int. ohm^{-1} cm^{-1}		$\overline{12}.046\ 3889$
1 microhm^{-1}-centimeter^{-1}	=	1.0000 × 10^{6}	ohm^{-1} cm^{-1}		6.000 0000
1 microhm^{-1}-inch^{-1}	=	3 9370 × 10^{-1}	microhm^{-1} cm^{-1}	(U. S.)	$\bar{1}.595\ 1654$
1 ohm^{-1}-inch^{-1}	=	3 9370 × 10^{-7}	microhm^{-1} cm^{-1}	(U. S.)	$\bar{7}.595\ 1654$
1 ohm^{-1} (meter, millimeter^2)$^{-1}$	=	1.000 × 10^{-2}	microhm^{-1} cm^{-1}		$\bar{2}.000\ 0000$
1 ohm^{-1} (meter, millimeter)$^{-1}$	=	1.2732 × 10^{-2}	microhm^{-1} cm^{-1}		$\bar{2}.104\ 9101$
1 ohm^{-1} (mil, foot)$^{-1}$	=	6 0153	microhm^{-1} cm^{-1}	(U. S.)	0.779 2567
International Annealed Copper Standard (20°C)	=	0 5800	microhm^{-1} cm^{-1}		$\bar{1}.763\ 4280$
100% conductivity (20°C)	=	0 5800	microhm^{-1} cm^{-1}		$\bar{1}.763\ 4280$

* "Mho" is occasionally used instead of ohm^{-1}.

59. Electrical Mass Resistivity $[\epsilon^{-1}ml^{-3}t]$; $[\mu ml^{-1}t^{-1}]$

1 absolute ohm (meter, gram)	=	0 99948	Int. ohm (meter, gram)		1.999 7741
1 International ohm (meter, gram)	=	1.00052	abs. ohm (meter, gram)		0 000 2259
1 cgsm unit	=	9 9948 × 10^{-6}	Int. ohm (meter, gram)		$\bar{6}.999\ 7741$
1 cgse unit	=	8 9869 × 10^{16}	Int. ohm (meter, gram)		15.953 6111
1 ohm (mile, pound)	=	1 7513 × 10^{-4}	ohm (meter, gram)	(U. S.)	$\bar{4}.243\ 3663$
1 ohm (centimeter, gram)	=	1.0000 × 10^{4}	ohm (meter, gram)		4.000 0000
1 ohm (centimeter, gram)	=	D*	ohm-cm		
†International Annealed Copper Standard at 20°C	=	0 15328	ohm (meter, gram)		$\bar{1}.185\ 4738$

* D represents the density in grams per centimeter^3 † Density = 8.89 grams per centimeter^3. *See* Table 61

60. Electrical Mass Conductivity $[\epsilon m^{-1}l^3t^{-1}]$; $[\mu^{-1}m^{-1}lt]$

1 absolute ohm^{-1} (meter, gram)	=	1.00052	Int. ohm^{-1} (meter, gram)	0.000 2259
1 International ohm^{-1} (meter, gram)	=	0 99948	abs. ohm^{-1} (meter, gram)	$\bar{1}.999\ 7741$
1 cgsm unit^{-1}	=	1 00052 × 10^{5}	Int. ohm^{-1} (meter, gram)	5.000 2259
1 cgse unit^{-1}	=	1 1127 × 10^{-16}	Int. ohm^{-1} (meter, gram)	$\overline{16}\ 046\ 3889$
1 ohm^{-1} (mile, pound)	=	5.7100 × 10^{-3}	ohm^{-1} (meter, gram)	$\bar{3}.756\ 6337$
1 ohm^{-1} (centimeter, gram)	=	1.0000 × 10^{-4}	ohm^{-1} (meter, gram)	$\bar{4}.000\ 0000$
1 ohm^{-1} (centimeter, gram)	=	*D^{-1} (ohm-centimeter)$^{-1}$		

* D^{-1} = reciprocal of the density in grams per centimeter^3.

61. Constants of Annealed Copper as Accepted at Various Times

Data taken from U. S Bur Standards Circular No 31

Temperature °C	England (Eng. Stds. Com. 1901)	Germany (Old "Normal Kupfer" density = 8 91)	Germany (Old "Normal Kupfer" assuming density 8.89)	Lindeck, Matthiessen, assuming density 8.89	A. I. E. E. before 1907 (Matthiessen value)	A. I. E. E. 1907 to 1910	Bureau Standards and A. I. E. E. 1911	Inter. Annealed Copper Standard 1913
				Resistivity in ohms (meter, grams)				
0	0.14136_2	$0\ 13959_0$	$0\ 13927_7$	0.14157_1	**0.14172_9**	**0.14172_8**	0.14106_8	0.14133_2
15	$0\ 15013_7$	**0.14850_2**	**0.14816_4**	**0.14997_4**	0.15014_1	0.15065_8	$0\ 15003_4$	0.15029_0
15.6	**0.1508**							
20	$0\ 15346_3$	0.15147_0	$0\ 15113_0$	0.15285_1	$0\ 15302_2$	$0\ 15363_4$	**0.15302_2**	**0.15328**
25	$0\ 15648_8$	$0\ 15444_0$	$0\ 15409_8$	$0\ 15576_5$	$0\ 15593_8$	$0\ 15661_0$	0.15601_0	0.15626_2
				Temperature coefficient of resistance (mass constant)				
0	**0.00428**	0.00425_5	$0\ 00425_5$	$\frac{1}{R_t} = \frac{1}{R_o}(1-3\ 8701t \times 10^{-3} + 9.009t^2 \times 10^{-6})$		**0.0042**	0.00427_7	0.00426_5
15	0.00402_2	**0.004**	**0.004**			$0\ 00395_1$	0.00401_9	0.00400_9
20	$0\ 00394_3$	$0\ 00392_2$	$0\ 00392_2$			0.00387_5	**0.00394**	**0.00393**
25	$0\ 00386_6$	$0\ 00384_6$	0.00384_6			0.00380_1	0.00386_4	0.00385_4
				Density				
	8.89 15.6°	8.91	(8 89)	(8 89)	8.89	8.89	8.89 20°	8.89 20°

CONVERSION FACTORS.—*Continued*

62. Ionic Mobility $[\epsilon^{\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{3}{2}}]$; $[\mu^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}t]$

ntimeter^2 second^{-1} per cgse unit of potential	=	3.3349×10^{-3}	cm^2 sec^{-1} volt^{-1} (abs.)	$\bar{3}$.523 0815
ch^2 second^{-1} per cgse unit of potential	=	2.1515×10^{-2}	cm^2 sec^{-1} volt^{-1} (abs.)	(U. S.) $\bar{2}$.332 7507
ch^2 second^{-1} volt^{-1} (absolute)	=	6 4516	cm^2 sec^{-1} volt^{-1} (abs.)	(U. S.) 0.809 6692

63. Thermoelectric Power $[\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}T^{-1}]$; $[\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}T^{-1}]$

m unit of potential per °C	=	1.0000×10^{-2}	microvolt per °C (abs.)	$\bar{2}$.000 0000
m unit of potential per °F	=	$1\ 8000 \times 10^{-2}$	microvolt per °C (abs.)	$\bar{2}$.255 2725
se unit of potential per °C	=	$2\ 9986 \times 10^{8}$	microvolt per °C (abs.)	8 476 9185
se unit of potential per °F	=	$5\ 3975 \times 10^{8}$	microvolt per °C (abs.)	8 732 1910
icrovolt per °F	=	1 8000	microvolt per °C	0.255 2725

64. Peltier Coefficient $[\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}]$; $[\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}]$

joule per ampere-hour (absolute)	=	2.7778×10^{-3}	joule em^{-1}	$\bar{3}$.443 6975
joule per ampere-hour (absolute)	=	$9\ 2636 \times 10^{-14}$	joule es^{-1}	$\overline{14}$.966 7790
joule per coulomb	=	10 000	joule em^{-1}	1.000 0000
joule per faraday	=	$1\ 0363 \times 10^{-4}$	joule em^{-1}	$\bar{4}$.015 4727
joule per electron	=	$6\ 2811 \times 10^{19}$	joule em^{-1}	19.798 0361
calorie (15°C) per ampere-hour	=	1.1625×10^{-2}	joule em^{-1}	$\bar{2}$.065 3930
calorie (15°C) per coulomb	=	41 850	joule em^{-1}	1.621 6955
millivolt	=	$1\ 0000 \times 10^{-2}$	joule em^{-1}	$\bar{2}$.000 0000

65. Thomson Effect, Coefficient of; Specific Heat of Electricity $[\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}T^{-1}]$; $[\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}T^{-1}]$

joule coulomb^{-1} per °F	=	1 8000	joule coulomb^{-1} per °C	0.255 2725
joule es^{-1} per °F	=	$5\ 3975 \times 10^{9}$	joule coulomb^{-1} per °C	9.732 1910
joule em^{-1} per °F	=	0 1800	joule coulomb^{-1} per °C	$\bar{1}$.255 2725
joule es^{-1} per °C	=	$2\ 9986 \times 10^{9}$	joule coulomb^{-1} per °C	9.476 9185
joule faraday^{-1} per °C	=	1.0363×10^{-5}	joule coulomb^{-1} per °C	$\bar{5}$.015 4727
joule electron^{-1} per °C	=	$6\ 2811 \times 10^{18}$	joule coulomb^{-1} per °C	18.798 0361
volt per °C	=	1 0000	joule coulomb^{-1} per °C	0.000 0000

66. Piezoelectric Constant $[\epsilon^{\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}t]$; $[\mu^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}t^{2}]$

em per kilogram weight (*g.*)	=	$3\ 0577 \times 10^{4}$	es per dyne	4.485 3978
em per pound weight (*g.*)	=	$6\ 7411 \times 10^{4}$	es per dyne	4.828 7321
es per kilogram weight (*g.*)	=	$1\ 0197 \times 10^{-6}$	es per dyne	$\bar{6}$.008 4793
es per pound weight (*g.*)	=	$2\ 2481 \times 10^{-6}$	es per dyne	$\bar{6}$.351 8136
coulomb per kilogram weight (*g.*)	=	$3\ 0577 \times 10^{3}$	es per dyne	3.485 3978
faraday per kilogram weight (*g.*)	=	$2\ 9507 \times 10^{8}$	es per dyne	8.469 9251
electron per kilogram weight (*g.*)	=	$4\ 868 \times 10^{-16}$	es per dyne	$\overline{16}$.687 3617

67. Magnetic Field Intensity; Magnetic Potential Gradient; Magnetizing Force $[\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}]$; $[\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}]$

1 gauss, absolute	=	1.00010	Int. gauss (v)	0.000 0434
1 gauss, absolute	=	1 00007	Int. gauss (a)	0 000 0304
1 International gauss (v)	=	0 99990	abs. gauss	$\bar{1}$.999 9566
1 International gauss (a)	=	0 99993	abs. gauss	$\bar{1}$.999 9696
1 cgsm unit	=	1.0000	abs. gauss	0.000 0000
1 cgse unit	=	$3\ 3349 \times 10^{-11}$	abs. gauss	$\overline{11}$.523 0815
1 gilbert per centimeter	=	1 0000	gauss	0.000 0000
1 ampere-turn per centimeter	=	1 2566	gauss	0.099 2099
1 ampere-turn per inch	=	0 49474	gauss	(U. S.) $\bar{1}$.694 3753
1 gamma, γ	=	$1\ 0000 \times 10^{-5}$	gauss	$\bar{5}$ 000 0000

68. (Magnetic Field Intensity)$^{-1}$; Coefficient of Leduc Effect $[\epsilon^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}t^{2}]$; $[\mu^{\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}t]$

1 gauss^{-1} (absolute)	=	0 99990	Int. gauss^{-1} (v)	1.999 9566
1 International gauss^{-1} (v)	=	1.00010	gauss^{-1} (abs.)	0.000 0434
1 cgsm unit^{-1}	=	1 0000	gauss^{-1} (abs.)	0.000 0000
1 cgse unit^{-1}	=	2.9986×10^{10}	gauss^{-1} (abs.)	10.476 9185
1 centimeter per gilbert	=	1 0000	gauss^{-1}	0.000 0000
1 centimeter per ampere-turn	=	$7\ 9577 \times 10^{-1}$	gauss^{-1}	$\bar{1}$.900 7901
1 inch per ampere-turn	=	2 0213	gauss^{-1}	0.305 6246

CONVERSION FACTORS.—*Continued*

69. Magnetomotive Force; Magnetic Potential $[\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}]$; $[\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}]$

1 gilbert, absolute	=	1 00010	Int. gilbert (v)	0.000 0434
1 gilbert, absolute	=	1.00007	Int. gilbert (a)	0.000 0304
1 International gilbert (v)	=	0.99990	abs. gilbert	$\bar{1}$.999 9566
1 International gilbert (a)	=	0.99993	abs. gilbert	$\bar{1}$.999 9696
1 cgsm unit	=	1 00000	abs. gilbert	0.000 0000
1 cgse unit	=	3 3349 × 10^{-11}	abs. gilbert	$\overline{11}$.523 0815
1 ampere-turn	=	1 2566	gilbert	0.099 2099

70. Magnetic Induction; Intensity of Magnetization $[\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{3}{2}}]$; $[\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}]$

Units of Magnetization are not named

1 maxwell per centimeter², absolute	=	0.99958	Int. maxwell per cm² (v)	$\bar{1}$.999 8176
1 maxwell per centimeter², absolute	=	0 99955	Int. maxwell per cm² (a)	$\bar{1}$.999 8046
1 International maxwell per centimeter² (v)	=	1 00042	abs. maxwell per cm²	0.000 1824
1 International maxwell per centimeter² (a)	=	1 00045	abs. maxwell per cm²	0.000 1954
1 maxwell per inch²	=	0 15500	maxwell per cm²	(U. S.) $\bar{1}$.190 3308
1 cgsm unit	=	1 00000	abs. maxwell per cm²	0.000 0000
1 cgse unit	=	2 9986 × 10^{10}	abs. maxwell per cm²	10 476 9185
1 line per centimeter²	=	1 00000	maxwell per cm²	0.000 0000
1 line per inch²	=	0.15500	maxwell per cm²	(U. S.) $\bar{1}$ 190 3308

71. Flux of Magnetic Induction; Magnetic Flux; Pole Strength; Quantity of Magnetism $[\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}]$; $[\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-1}]$

Units of Pole Strength and Quantity of Magnetism are not named

1 maxwell, absolute	=	0 99958	Int. maxwell (v)	1 999 8176
1 maxwell, absolute	=	0 99955	Int. maxwell (a)	$\bar{1}$ 999 8046
1 International maxwell (v)	=	1.00042	abs. maxwell	0.000 1824
1 International maxwell (a)	=	1 00015	abs. maxwell	0 000 1954
1 cgsm unit	=	1 0000	abs. maxwell	0.000 0000
1 cgse unit	=	2 9986 × 10^{10}	abs. maxwell	10.476 9185
1 line	=	1 0000	abs. maxwell	0 000 0000
1 volt-second	=	1 0000 × 10^{8}	maxwell	8 000 0000

72. Magnetic Reluctance $[\epsilon l t^{-2}]$; $[\mu^{-1}l^{-1}]$

1 oersted, absolute	=	1 00052	Int. oersted	0.000 2259
1 International oersted		0 99948	abs. oersted	$\bar{1}$.999 7741
1 cgsm unit	=	1 0000	abs. oersted	0.000 0000
1 cgse unit	=	1 1122 × 10^{-21}	abs. oersted	$\overline{21}$ 046 1630

73. Hall Effect, Coefficient of $[\epsilon^{-\frac{3}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}t^{3}]$; $[\mu^{\frac{3}{2}}m^{-\frac{1}{2}}l^{\frac{5}{2}}]$

1 volt centimeter per ampere gauss (absolute)	=	1.0000 × 10^{9}	cgsm unit	9.000 0000
1 volt inch per ampere gauss (absolute)	=	2.5400 × 10^{9}	cgsm unit	(U. S.) 9.404 8346
1 cgse unit	=	2.6962 × 10^{31}	cgsm unit	31.430 7555

74. Ettinghausen Effect, Coefficient of $[\epsilon^{-1}m^{-1}l^{-1}t^{4}T]$; $[\mu m^{-1}l t^{2}T]$

1°C centimeter per ampere gauss (absolute)	=	10 000	°C cm per cgsm unit	1 000 0000
1°F inch per ampere gauss (absolute)	=	45.720	°C cm per cgsm unit	1.660 1071
1°C centimeter per cgse unit	=	8 9916 × 10^{20}	°C cm per cgsm unit	20 953 8370

75. Nernst Effect, Coefficient of $[\epsilon^{-1}tT^{-1}]$; $[\mu l^{2}t^{-1}T^{-1}]$

1 volt per gauss °C (absolute)	=	1.0000 × 10^{8}	cgsm unit per °C	8.000 0000
1 volt per gauss °F (absolute)	=	1.8000 × 10^{8}	cgsm unit per °C	8.255 2725
1 cgse unit per °C	=	8.9916 × 10^{20}	cgsm unit per °C	20.953 8370

76. Verdet's Constant $[\epsilon^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{3}{2}}t^{2}\theta]$; $[\mu^{\frac{1}{2}}m^{-\frac{1}{2}}l^{-\frac{1}{2}}t\theta]$

1 minute per gilbert	=	1.0000	minute per cgsm unit	0.000 0000
1 minute per ampere-turn	=	1.2566	minute per cgsm unit	0.099 2099
1 radian per gilbert	=	3 4377 × 10^{3}	minute per cgsm unit	3.536 2739

77. Fundamental Electric and Magnetic Units

Name of quantity	1 *Cgsm unit equals		Dimensions		
	Cgse units	Practical units (abs.)	Cgse system	Cgsm system	†Practical system
Electric:					
Capacity	c^2	10^9 farad	ϵl	$\mu^{-1}l^{-1}t^{2}$	$IE^{-1}t$
Charge, quantity	c	10 coulomb	$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-1}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	It

CONVERSION FACTORS.—*Continued*

77. Fundamental Electric and Magnetic Units.—(*Continued*)

Conductivity (mass)	c^2	10^9 ohm^{-1} (cm, g)	$\epsilon m^{-1}l^3t^{-1}$	$\mu^{-1}m^{-1}lt$	$R^{-1}m^{-1}l^2$
Conductivity (surface)	c^2	10^9 ohm^{-1}	ϵlt^{-1}	$\mu^{-1}l^{-1}t$	R^{-1}
Conductivity (volume)	c^2	10^9 ohm^{-1} cm^{-1}	ϵt^{-1}	$\mu^{-1}l^{-2}t$	$R^{-1}l^{-1}$
Current	c	10 ampere	$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	I
Dielectric constant	c^2	†10^9 ohm^{-1} per (cm sec^{-1})	ϵ	$\mu^{-1}l^{-2}t^2$	†$IE^{-1}l^{-1}t$
Displacement (local)	c	10 coulomb per cm^2	$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{3}{2}}$	$Il^{-2}t$
Displacement (integral)	c	10 coulomb	$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-1}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	It
Electromotive force	c^{-1}	10^{-8} volt	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}$	E
Field strength	c^{-1}	10^{-8} volt cm^{-1}	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	El^{-1}
Inductance	c^{-2}	10^{-9} henry	$\epsilon^{-1}l^{-1}t^2$	μl	Rt
Inductivity	c^2	† 10^9 ohm^{-1} per (cm sec^{-1})	ϵ	$\mu^{-1}l^{-2}t^2$	†$IE^{-1}l^{-1}t$
Ionic mobility	c	10^8 cm sec^{-1} per (volt cm^{-1})	$\epsilon^{\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{3}{2}}$	$\mu^{-\frac{1}{2}}m^{-\frac{1}{2}}l^{\frac{1}{2}}t$	$E^{-1}l^2t^{-1}$
Polarization capacity	c^2	10^9 farad cm^{-2}	ϵl^{-1}	$\mu^{-1}l^{-3}t^2$	$IE^{-1}l^{-2}t$
Potential	c^{-1}	10^{-8} volt	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}$	E
Resistance	c^{-2}	10^{-9} ohm	$\epsilon^{-1}l^{-1}t$	μlt^{-1}	R
Resistivity (mass)	c^{-2}	10^{-9} ohm (cm, g)	$\epsilon^{-1}ml^{-3}t$	$\mu ml^{-1}t^{-1}$	Rml^{-2}
Resistivity (surface)	c^{-2}	10^{-9} ohm	$\epsilon^{-1}l^{-1}t$	μlt^{-1}	R
Resistivity (volume)	c^{-2}	10^{-9} ohm-cm	$\epsilon^{-1}t$	μl^2t^{-1}	Rl
Specific heat of electricity (Thomson)	c^{-1}	10^{-8} volt deg^{-1}	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}T^{-1}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}T^{-1}$	ET^{-1}
Specific inductive capacity	1	1	zero	zero	zero
Iagnetic:					
Field intensity	c	1 gauss	$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	Il^{-1}
Flux of induction (integral)	c^{-1}	1 maxwell	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-1}$	Et
Induction (local)	c^{-1}	1 maxwell cm^{-2}	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{3}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	$El^{-2}t$
Intensity of magnetization (volume)	c^{-1}	1	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{3}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	$El^{-2}t$
Magnetic flux (integral)	c^{-1}	1 maxwell	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-1}$	Et
Magnetizing force	c	1 gauss	$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{-\frac{1}{2}}t^{-1}$	Il^{-1}
Magnetomotive force	c	1 gilbert	$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	I
Permeability	c^{-2}	1 maxwell cm^{-2} per gauss	$\epsilon^{-1}l^{-2}t^2$	μ	$I^{-1}El^{-1}t$
Pole strength	c^{-1}	1	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-1}$	Et
Potential	c	1 gilbert	$\epsilon^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-2}$	$\mu^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}t^{-1}$	I
Quantity	c^{-1}	1	$\epsilon^{-\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{1}{2}}$	$\mu^{\frac{1}{2}}m^{\frac{1}{2}}l^{\frac{3}{2}}t^{-1}$	Et
Reluctance	c^2	1 oersted	ϵlt^{-2}	$\mu^{-1}l^{-1}$	$IE^{-1}t^{-1}$
Susceptibility	c^{-2}	$1/4\pi$ maxwell cm^{-2} per gauss	$\epsilon^{-1}l^{-2}t^2$	μ	$I^{-1}El^{-1}t$

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* For the purposes of International Critical Tables, c has been taken as 2.9986×10^{10} cm per sec, $\log_{10}$ c = 10.476 9185, $\log_{10}$ c^{-1} = 11.523 0815. This the accepted value for the velocity of light in vacuo. The best directly determined value of the ratio of the two electrical units of quantity gives c = $.9979 \times 10^{10}$ cm per sec. (Rosa and Dorsey, *Bull. U. S. Bur Standards*, 3: 433; 07.)

† In practice this unit is not used; the quantity given in essentially every instance is the dimensionless "specific inductive capacity," which is numerically qual to the dielectric constant expressed in cgse units.

‡ In this column are given the dimensions in terms of the practical electrical units, as these generally enter into the actual determinations of the several quantities. As three basic electrical units are employed, alternative expressions are possible. T = thermometric degree, E = potential, I = current, = resistance.

78. Indicated Conversion Factors

a = area, C = electrical capacity, T = thermometric degree, = density, E = electrical potential, e = electric charge, F = lectrical field intensity, h = heat, m = mass, Q = quantity of nagnetism, R = electrical resistance, t = time, v = volume, ϵ = lielectric constant, η = viscosity, θ = plane angle.

Name of quantity	Dimensions	Tables
lectricity		
Electric displacement	ϵF	14, 53
Polarization capacity	Ca^{-1}	56, 17
Pyroelectric constant	$ea^{-1}T^{-1}$	19, 17, 12
Specific inductive capacity	zero	
Surface density of charge	ea^{-1}	49, 17
Thermoelectric power	ET^{-1}	52, 12
Volume density of charge	ev^{-1}	49, 19
leat, capacity	$hm^{-1}T^{-1}$	35, 21
Latent	hm^{-1}	35, 4
Reaction	hm^{-1}	35, 4
Superficial latent	ha^{-1}	35, 17
Transformation	hm^{-1}	35, 4
Radiation, index of absorption	zero	
Intensity of	$ha^{-1}t^{-1}$	35, 22
Kerr's constant (magneto-optic)	$\theta Q^{-1}a$	7, 71, 16
Reflectivity	zero	
Refraction, index of	zero	
Solubility, gases in liquids	zero	
Viscosity, kinematic	ηd^{-1}	39, 28

79. Hydrometer Scales

Unless the hydrometer is used in the liquid and at the temperature for which it is graduated, corrections must be applied for the changed capillary depression and for the expansion (or contraction) of the instrument. (The following table does not include all scales which have been used.)

T = temperature at which the instrument is to be used; r = reading of instrument; the specific gravity is with reference to water at temperature T unless another temperature is indicated in the last column.

79. Hydrometer Scales.—*Continued*

Hydrometer	T	Specific gravity Dense	Specific gravity Light	Remarks
A. P. I. = American Petroleum Institute.	*60°F = 15.56°C*		$\frac{141.5}{131.5 + r}$	*Petroleum*
Balling	17.5°C	$\frac{200}{200 - r}$	$\frac{200}{200 + r}$	
Bates	60°F = 15.56°C	$\frac{1000 + 2.78r}{1000}$		
Baumé	10°R = 12.5°C	$\frac{145.88}{145.88 - r}$	$\frac{145.88}{135.88 + r}$	
Baumé	15°C	$\frac{146.3}{146.3 - r}$	$\frac{146.3}{136.3 + r}$	
Baumé	17.5°C	$\frac{146.78}{146.78 - r}$	$\frac{146.78}{136.78 + r}$	
Baumé	15°C	$\frac{144.3}{144.3 - r}$		"Rational"
Baumé	15°C	$\frac{144.3}{144.3 - r}$		"Rational" (water at 4°C)
Baumé-Lunge	12.5°C	$\frac{144.32}{144.32 - r}$	$\frac{144.32}{144.32 + r}$	"Rational"
Baumé	15°C	$\frac{144.32}{144.32 - r}$	$\frac{144.32}{144.32 + r}$	French (water at 4°C)
Baumé	60°F = 15.56°C	$\frac{145}{145 - r}$	$\frac{140}{130 + r}$	American
Beck	12.5°C	$\frac{170}{170 - r}$	$\frac{170}{170 + r}$	
Brix	12.5°R = 15.625°C	$\frac{400}{400 - r}$	$\frac{400}{400 + r}$	
Cartier	12.5°C	$\frac{136.8}{126.1 - r}$	$\frac{136.8}{126.1 + r}$	
Fischer	12.5°R = 15.625°C	$\frac{400}{400 - r}$	$\frac{400}{400 + r}$	
Fleischer		$\frac{1000 + 10r}{1000}$		
Gay-Lussac		$\frac{100}{100 - r}$	$\frac{100}{100 + r}$	
Gerlach, or "new"	17.5°C	$\frac{146.78}{146.78 - r}$		
Holland, or "old"	12.5°C	$\frac{144}{144 - r}$		
Stoppani	12.5°R = 15.625°C	$\frac{166}{166 - r}$		
Twaddell	60°F = 15.56°C	$\frac{1000 + 5r}{1000}$		British (water at 4°C)

TECHNICAL EFFLUX VISCOMETERS: INTERPRETATION AND INTERCONVERSION OF READINGS

WINSLOW H. HERSCHEL

Since changes are made from time to time in the standardization or method of operation of these instruments, and many old instruments are still in use, it is believed that in general the determination of kinematic viscosity from the readings of the instruments, and direct interconversions between instruments, when used at the same temperature, may be made by the use of Fig. 1, with as great precision (about 5%) as the data will warrant. It is assumed that the instruments are used in the normal manner. For the Saybolt instruments, a higher precision is occasionally justified, and may be obtained by the use of Table 2.

If the instruments are used at different temperatures, appropriate temperature corrections must be applied. For lubricating oils, the viscosity at one temperature may be estimated from that at another by the approximate empirical rule, applicable between 100° and 212°F (37.8° and 100°C), that the logarithmic viscosity-temperature graphs are straight and meet at a point, temperatures being expressed in degrees Fahrenheit. (For other temperatures see (1, 7, 8)). The location of the point of intersection for several classes of oils is given in Table 1.

TABLE 1.—COORDINATES OF POINTS OF INTERSECTION OF LOGARITHMIC GRAPHS(5)

η_0 = viscosity in poises; t_0 = temperature in °F

Class of oils	$\log_{10} \eta_0$	η_0	$\log_{10} t_0$	t_0
Paraffin base	$\bar{3}.58$	0.0038	2.77	589
Naphthene base	$\bar{3}.88$	.0076	2.57	371
Mixed base	$\bar{3}.43$	.0027	2.78	605
Fatty oils	$\bar{3}.75$	.0056	2.82	661

In estimating the viscometer reading at a given temperature for a certain type of instrument, from an observed reading at another temperature with another type of instrument, the following steps may be taken.

1. Determine the kinematic viscosity corresponding to the observed reading by means of Fig. 1.
2. Multiply by the density (g/cm³) so as to obtain the absolute viscosity (η) in poises; find the logarithm of the absolute viscosity and the logarithm of the temperature (t) of test (°F).
3. Plot the observed η, t and the η_0, t_0 of the point of intersection, as given in Table 1, on logarithmic paper. Or plot the corresponding logarithms on equispaced coordinate paper. In either case, these two points locate a straight graph upon which the viscosity at the desired temperature will be found.
4. Divide the absolute viscosity at the desired temperature by the density at that temperature to get the kinematic viscosity. From this, determine, by means of Fig. 1, the corresponding time of flow on the desired viscometer.

It will be noted that the density under (2) and (4) must be the density at the temperature under consideration, and not the density at 60°F (15.6°C), which is generally the standard for such density determinations.

If an instrument is used in an irregular manner, appropriate corrections must be applied (2, 3, 6, 9).

TABLE 2.—SAYBOLT UNIVERSAL AND SAYBOLT FUROL VISCOMETERS
Units: Time (t), sec; kinematic viscosity = (η/d), poise/(g per cm³).

Saybolt Universal		Saybolt Furol	
t	η/d	t	η/d
32	0.0115	25	0.486
40	0.0417	26	0.512
50	0.0740	27	0.537
60	0.103	28	0.562
70	0.130	29	0.586
80	0.156	30	0.610
90	0.181	35	0.730
100	0.206	40	0.846
125	0.266	45	0.960
150	0.324	50	1.072
175	0.381	60	1.292
200	0.437	70	1.507
225	0.492	80	1.724
250	0.548	90	1.939
275	0.603	100	2.155
300	0.658		

For higher viscosities the kinematic viscosity is equal to 0.00220t for the Saybolt Universal, or to 0.0216t for the Saybolt Furol.

LITERATURE

(For a key to the periodicals see end of volume)

(1) Fortsch and Wilson, *45*, **16**: 789, 24. (2) Ganz, *262*, **6**: 218; 99. (3) Herschel, *32*, No. **100**; 17. (4) Herschel, *244*, **10**: 31; 22. (5) Herschel, *45*, **14**: 715; 22. (6) Holde, Examination of hydrocarbon oils, 1917. (7) Lane and Dean, *45*, **16**: 905; 24 (8) MacCoull, *253*, **7**: No. 6; 21. (9) Ubbelohde, Tabellen zum Englerschen Viskosimeter, 1907.

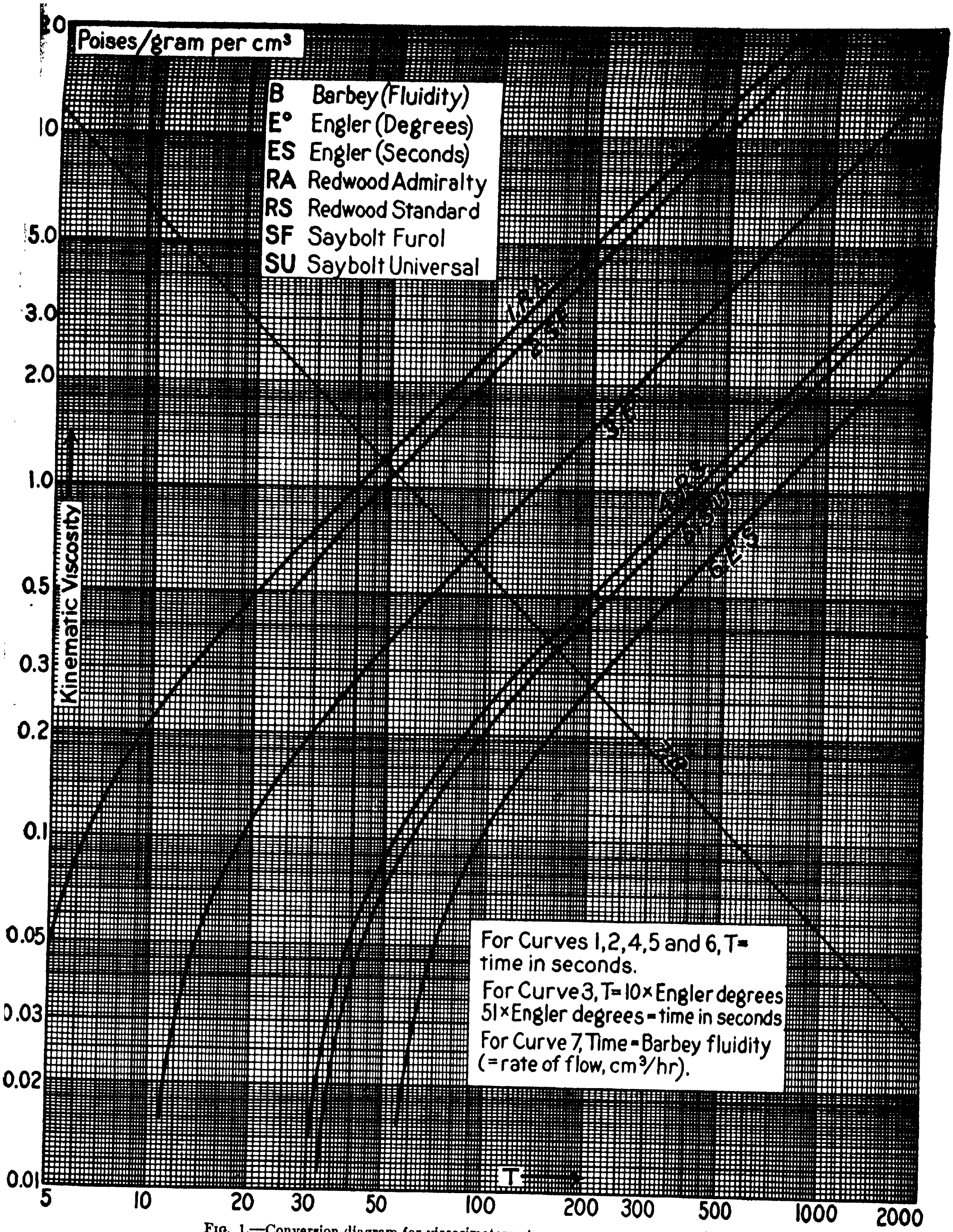

FIG. 1.—Conversion diagram for viscosimeters at a common temperature (4).

SELECTED TECHNICAL TERMS

N. ERNEST DORSEY

In this section are given the definitions of numerous units, and very brief explanations of such technical terms as occur in many sections of the I. C. T. or are for other reasons more suitably considered here than elsewhere. Other terms will be explained where they occur in the body of the work. Symbolical explanations will be given wherever they appear to be satisfactory. In many cases, dimensional formulae (see p. 18) are given; these are enclosed in [ ]. Symbols are enclosed in ( ). The sequence will be: Name, symbol or symbols, dimensional formula, definition or explanation; but the symbol or formula, or both may be omitted. For the explanation of the symbols employed in the formulae and explanations, see p. 16.

Aberration, Constant of. $[\theta]$. tan $(V-v)/c$. V, v = maximum and minimum velocity of earth in its orbit, c = velocity of light in vacuo.

Absolute.—(abs.). 1. An adjective, descriptive of a system of units which is based upon the smallest possible number of independent units. In this connection, every specification of a definite substance or of a vacuum is to be regarded as the introduction of an independent unit. 2. **Absolute zero.** The temperature at which the pressure of a fixed mass of an ideal gas, maintained at a constant volume, becomes zero. 3. **Absolute temperature.** The temperature reckoned from the absolute zero.

Absorption. When the absorption of radiation by a substance is such that $J = J_0e^{-kl}$, J, J_0 = intensity, l = length of path, k is the **coefficient of absorption.** k/d = coefficient of **mass absorption.** Writing $k = (4\pi k'n)/\lambda$, n = index of refraction, λ = wave length in vacuo, k' = **index of absorption.** (Some call $k'n$ the index.)

Absorptivity. Ratio of radiant energy absorbed to that absorbed, under same conditions, by a black body.

Action, Planck's constant of.—*See* Planck.

Ampere. Unit of electric current. **Abs. ampere** = 0.1 cgs unit. **Int. ampere** is that unvarying electric current which, when passed through a solution of silver nitrate in water, in accordance with certain specifications, deposits silver at the rate of 0.00111800 gram per second.

Ampere-turn.—Unit of mmf. Difference in magnetic potential between the faces of a coil of one turn carrying one ampere.

Ångstrom unit.—(Å). [l]. 10^{-10} meters. **International Ångstrom** defined as such a length that wave-length of red cadmium line in air at 15°C, A_n, is exactly 6438.4696 Int. Å; it = 10^{-10} m within experimental error.

Anomalistic.—Anom. year [month] = time between successive passages of earth [moon] through perihelion [perigee].

Aphelion.—Point of planet's orbit farthest from sun.

Apogee.—Point of moon's orbit farthest from earth.

Aries, First point of.—Designation of position of vernal equinox (*see* Celestial sphere); not at present in constellation Aries.

Assay ton. $[m]$. $29\frac{1}{6}$ grams; as many mg as there are troy ounces in short ton.

Astronomical unit of length. Mean distance (*q.v.*) earth to sun; 149.50×10^6 km.

Astronomical unit of mass.—Mass of sun.

Astronomical unit of time.—Mean solar day.

Atmosphere.—[force area^{-1}], $[m/lt^2]$. 1. **Normal atmosphere** (A_n) defined as pressure exerted by vertical column of liquid 76 cm long, density 13.5951 grams per cm^3, acceleration of gravity being 980.665 cm sec^{-2}. 2. **Atmosphere at 45°** (A_{45}) differs from A_n only in use of acceleration of gravity at sea level and lat. 45° instead of 980.655 cm sec^{-2}. 3. **British atmosphere** is based on 30 inches instead of 76 cm.

Avogadro's number.—(N_0). $[m^{-1}]$. Number of molecules in a mole.

Bar.—[force/area], $[m/lt^2]$. Internationally accepted unit of pressure; = 10^6 dyne/cm^2. Has also been used to denote one dyne/cm^2 (*cf.* Barye).

Barye.—[force/area], $[m/lt^2]$. The cgs unit of pressure, one dyne/cm^2. (In accordance with recommendation of special committee of International Congress of Physicists, Paris, 1900, and with the usage of the International Bureau of Weights and Measures.) (*cf.* Bar).

B. A. unit.—A unit of electrical resistance based on certain coils prepared in 1863–1864 by British Association for Advancement of Science.

Black Body.—One which absorbs all radiant energy incident upon it. Its radiance of wave-length λ is $J_\lambda\, d\lambda$; the **intensity,** $J_\lambda = C_1\lambda^{-5}[e^{C_2/\lambda T} - 1]^{-1}$, T = absolute temperature, C_1, C_2 are **radiation constants.** **Total radiance** (J) is $\int J_\lambda\, d\lambda$ taken over all wave-lengths. $J = \sigma T^4$, σ = **Stefan,** or **Stefan-Boltzmann** constant of total radiation. For each T there is a wave-length (λ_m) for which $J_\lambda (= J_m)$ is a maximum; $J_m = C_jT^5$, C_j = **intensity coefficient**; $\lambda_m = w/T$, w = **Wien's displacement constant.**

Board of Trade unit.—1. A unit of **electrical resistance** based upon certain coils preserved by British Board of Trade. 2. (B.T.u.). Unit of **work.** Generally used in England as equivalent of one kilowatt-hour. (To be distinguished from British thermal unit (BTU).)

Boltzmann's molecular gas constant.—(k_0). $[ml^2/t^2T]$. Gas constant (*q.v.*) per molecule.

Bougie decimale.—$[\psi\omega^{-1}]$. An old unit of luminous intensity, 0.05 Violle unit.

Brightness.—$[\psi/l^2\omega]$. Luminous intensity per unit of apparent area of the luminous surface; if emission follows Lambert's law, brightness is independent of direction of line of sight, otherwise it is not; in latter case, line of sight is assumed to be normal to the surface unless the contrary is stated.

British Thermal Unit.—(BTU). [energy], $[ml^2/t^2]$. Heat per pound, per °F of rise, required to produce small rise in temperature of water under pressure A_n; varies with temperature, which must be stated. **"Mean" BTU** = $\frac{1}{180}$ of heat required to raise one lb. of water from 32°F to 212°F, pressure A_n. (To be distinguished from Board of Trade unit (B.T.u.).)

Bulk modulus.—[stress], $[m/lt^2]$. Hydrostatic pressure divided by resulting decrease in volume per unit volume. Also called **volume elasticity, cubical elasticity, resistance to compression, modulus of compression** (*cf.* compressibility).

Calorie.—[Heat], $[ml^2/t^2]$. 1. Heat per unit of mass, per °C of rise, required to produce small rise in temperature of water under pressure A_n; varies with temperature, which must be stated. If unit of mass is gram, it is called small calorie, gram calorie, or calorie; symbol is cal. If unit of mass is kilogram, it is called large calorie, kilogram calorie, or Calorie; symbol, Cal. (2) **Mean calorie** = $\frac{1}{100}$ of heat required to raise unit mass of water from 0°C to 100°C, pressure A_n.

Candle.—(ca). $[\psi\omega^{-1}]$. Basic photometric unit of luminous-intensity. A value determined by international agreement, and maintained at certain national laboratories by means of incandescent electric lamps is known as the "International candle."

Candle per square centimeter.—$[\psi/l^2\omega]$. Brightness of surface which, in direction considered, has a luminous intensity of one candle per cm² of apparent area; π lamberts. Similarly: Candle per sq. in., etc.

Candlepower.—(c.p.). Luminous intensity in terms of candles.

Capacity, heat.—1. Of a substance, is heat per unit of mass, per degree of rise, required to produce a very small rise in temperature, also called **specific heat,** and **thermal capacity.** 2. Of a body, is heat, per degree of rise, required to heat the body.

Capacity, electrical.—Of body A with reference to body B is $Q/(V_A - V_B)$, all other bodies in the field being insulated and uncharged; Q = charge on A; V_A, V_B = potential of A, B.

Capacity, polarization.—Of one electrode with reference to another is its electrical capacity per unit of area.

Capillary constant.—(a). [l]. 1. **British usage:** $a_1^2 = \gamma/(d_1 - d_2)g$; γ = surface tension, g = acceleration of gravity. $(d_1 - d_2)$ = positive difference in the densities of the fluids separated by the surface. 2. **German usage:** $a_2^2 = 2\gamma/(d_1 - d_2)g$. (The subscripts to the a are usually omitted.)

Carat fine.—*See* Karat.

Carcel unit.—A superseded unit of luminous intensity; approximately = 9.6 Int. candles.

Celestial sphere.—Sphere, concentric with earth, serving to locate angular positions of celestial bodies; its intersection with plane of earth's orbit [equator] is called **ecliptic [celestial equator]**; intersections of ecliptic and equator are called **equinoxes**; motion of equinoxes with reference to stars is called **precession of equinoxes,** it is resultant of an oscillatory and a nearly uniform motion, a fictitious equinox possessing only the latter motion is called **mean equinox.** The mean equinox through which sun passes in spring of northern terrestrial hemisphere is called mean vernal equinox, and is point from which **celestial longitude** (along the ecliptic) and **mean right ascension** (R. A.) (along the equator) are measured—positive to the east. Intersections of the sphere and the axis of rotation of earth are called **celestial poles**; that of the sphere and its diameter perpendicular to plane of ecliptic called **poles of the ecliptic.** Declinations are measured from equator along great circles passing through the poles—positive towards north; **celestial latitudes,** from ecliptic along great circles passing through poles of ecliptic positive towards north. The pole of the sphere has a motion compounded of a nearly uniform progressive motion and a rotation about a point having the former motion; that point is called **mean pole,** its motion is the **precession of the pole,** the rotation of the true pole about the mean pole is called the nutation of the pole; mean (angular) distance between mean pole and true pole is called **constant of nutation.**

Centi-.—Prefix denoting $1/100$.

Centigrade.—(C). Thermometric system in which freezing point of water is called 0° and its boiling point is called 100°; pressure = A_n.

Centigrade thermal unit.—(CTU). [energy], [ml^2/t^2]. Differs from British Thermal Unit only in the substitution of Centigrade for Fahrenheit scale.

Centimeter.—(cm). 1. The cgs unit of **length,** 0.01 meter. 2 Often used to denote cgse unit of **electrical capacity.** 3 Occasionally used to denote cgsm unit of **electrical inductance.**

Centimeter-dyne.—[work], [ml^2/t^2]. One erg.

Centimeter of water [of mercury, etc.] at t°.—[force/area], [m/lt^2] Denotes pressure exerted by a vertical column of water [of mercury, etc.] one cm long, temperature t°, at a place where acceleration of gravity is g_s (= 980.665 cm/sec²).

Cheval-vapeur.—[work/time], [ml^2/t^3]. 1. Primary definition, 75 meter-kilograms per second. Also called **force de cheval, continental horsepower, Pferdekraft.** 2. For electrical purposes, generally regarded as exactly 736 watts; may be called **continental electrical horsepower.**

Circular inch.—(cir. in.). [l^2]. Area of a circle one inch in diameter. Similarly for **circular mil** (cir. mil), **circular millimeter** (cir. mm), etc.

Compressibility.—[lt^2/m]. Reciprocal of bulk modulus.

Compression, modulus of.—[m/lt^2]. *See* Bulk modulus.

Concentration.—1. The amount per unit of volume; may be called **volume concentration.** If amount is measured by mass, the symbol is C. 2. The mass of the material per unit of mass of the mixture containing it; may be called **mass concentration.** If both masses are expressed in terms of the same unit, this concentration is generally called the **titer** of the mixture.

Conductance.—Reciprocal of resistance.

Conductance, Specific.—*See* Conductivity, electrical.

Conductivity, Electrical.—Reciprocal of electrical resistivity (*q.v.*). 1. (κ) **Volume conductivity** = reciprocal of volume resistivity; specific conductance. 2. **Mass conductivity** = κ/d; d = density. 3. **Equivalent conductivity** (Λ) is κ/c; c = equivalents of solute per unit volume of solution. 4. **Molecular conductivity** (μ) is κ/m; m = moles of solute per unit volume of solution.

Conductivity, Thermal.—[(heat/area-time)/(T/l)]; [ml/Tt^3]. $dQ/dt = -k\,dx\,dy\,\frac{d\theta}{dz}$; k = thermal conductivity, dQ = amount of heat through $dx\,dy$, in direction dz, in time dt, $d\theta$ = increase in temperature in distance dz

Coulomb.—The quantity of electricity transferred in one second by a current of one ampere.

Critical. 1. Any point, line, or region serving to locate a well marked **transition** may be described as critical. 2. As regards **condensation** of vapors, the temperature corresponding to the isotherm above which liquefaction is impossible is called the **critical temperature;** the vapor pressure at which the two phases are in equilibrium at the critical temperature is the **critical pressure;** volume of unit mass at the critical pressure and temperature is the **critical volume.** These three values are called the **critical constants.**

Cubic. (cu.), (³). Used in conjunction with name of unit of length to form name of a related unit of volume; *e.g.*, cubic meter (cu. m) (m³) is name of a unit of volume equivalent to volume of a cube with edges one meter long.

Cubic centimeter atmosphere.—*See* Liter-atmosphere.

Curie. Internationally defined as amount of radon (radium emanation) which can exist in equilibrium with one gram of radium.

Current.—(I). The current of x through a surface S is $I = dx/dt$, where dx is the amount of x which passes through S in time dt. The density of the current through S at a given point is $\sigma_s = dI/dS$, where dI is the current at that point through an element of S of area dS. The value of σ varies with the orientation of dS, and for a certain orientation it is a maximum. The normal, in the direction of the flux, to the element so oriented is the **direction of the current;** and this maximum value of σ is called the **density,** or the **intensity,** of the current at that point.

Dalton.—[m]. A unit of mass, $1/16$ mass of atom of oxygen. Approximately 1.650×10^{-24} grams.

Day.—(da). [t]. 1. **Solar day** = interval between successive transits of sun across same meridian. It is not of uniform length. 2. **Mean solar day** = average length of all the solar days in a tropical year. This is the basis of all our time measurements and is what is meant by day unless the contrary is definitely indicated. 3. **Sidereal day** = interval between successive transits of true vernal equinox. 4. The day defined by successive transits of **same fixed star** is not used in astronomical computations, and appears to have no name.

Deci-.—Prefix denoting $1/10$.

Declination.—1. Of **celestial objects.** *See* Celestial sphere. 2. **Magnetic declination** = angular deviation of horizontal com-

ponent of earth's magnetic field from northerly measured geographic meridian; easterly deviations, positive.

Degree.—1. (°), (deg). Unit of difference in **temperature**; size depends upon thermometric scale employed. 2. (°). Unit of angle, $1/360$ of complete circumference. 3. (°). **Hydrometer degree** is an arbitrary unit of difference in specific gravity; its value depends upon type of hydrometer (*see* p. 31).

Deka-.—Prefix denoting 10.

Demal.—A concentration of one g-equivalent per dm^3.

Density.—1. **Volume density** = dQ/dv, dQ = amount of the physical quantity considered which is contained in the element of volume dv. 2. **Density of a substance,** (d), (D), is dm/dv, m = mass. When, on a particular scale of operation, the density varies from point to point, it may be that on a larger scale it will not; then the density on the larger scale may properly be called the **apparent density** (sometimes called **bulk density**) when operations on the smaller scale are being considered. 3. **Surface density** = dQ/ds, ds = element of area of surface over which dQ is distributed.

Dielectric constant.—(ϵ). $[t^2/\mu l^2]$, $[\epsilon]$. The force (f) of repulsion between two point charges (e, e') of electricity at a distance (r) apart in a uniform medium of great extent is $f = ee'/\epsilon r^2$; ϵ depends upon the nature of the medium, and is called its dielectric constant.

Diffusion, Coefficient of.—*See* Diffusivity.

Diffusivity.—1. (Δ). $\left[\frac{\text{quantity}}{\text{area time}} \quad \frac{\text{vol. concen.}}{\text{distance}}\right]$, $[l^2/t]$. $dQ/dt = -\Delta(dc/dx)dydz$. dQ = amount of Q passing through area $dydz$ in direction of x in time dt, dc/dx = rate of increase, in direction of x, of volume concentration of Q. Also called **coefficient of diffusion.** 2. **Heat diffusivity.** $\left[\frac{\text{heat}}{\text{area} \times \text{time}} + \frac{\text{specific heat} \times \text{density} \times \text{temp.}}{\text{distance}}\right]$, $\left[\frac{\text{heat conductivity}}{\text{density} \times \text{specific heat}}\right]$, $[l^2/t]$. $dQ/dt = -\Delta_t cd(dT/dx)dydz$, Δ_t = **heat diffusivity,** c = specific heat, d = density, T = temperature. $\Delta_t cd$ = **thermal conductivity.** Δ_t also called **temperature conductivity.**

Displacement constant, Wien's.—*See* Black body.

Displacement, Electric.—*See* Induction, electrostatic.

Draconic month.—*See* Nodical month.

Dyne.—$[ml/t^2]$. The cgs unit of force. The force which, when acting continuously upon a mass of one gram and not opposed by another, will impart to the mass a uniform acceleration of one cm per $sec.^2$

Dyne-centimeter.—[force length], $[ml^2/t^2]$. The torque of one dyne acting on a lever-arm of one cm.

Ecliptic.—*See* Celestial sphere.

Elastic modulus.—Ratio of stress to resulting elastic strain. There are as many types of moduli as there are types of strain. 2. Occasionally used to denote **Young's modulus.**

Elasticity.—1. **Cubical**; *see* Bulk modulus. 2. **Longitudinal**; *see* Young's modulus. 3. **Shear**; *see* Rigidity. 4. **Torsional**; *see* Rigidity. 5. **Modulus of**; *see* Elastic modulus.

Electric displacement, field strength, etc.—*See* corresponding nouns.

Electromagnetic unit of quantity of electricity.—*See* Quantity of electricity.

Electromotive force.—(E), (emf). *See* Potential.

Electron.—Negative electrons are very small negatively charged particles observed under many, very diverse conditions. All appear to be alike in every way, including amount of charge carried. They appear to be one of the basic elements of which atoms are made.

Electronic charge.—(e). A quantity of electricity, of either sign, which is numerically equal to the electric charge carried by an electron.

Electronic mass.—(m_o). The mass of a negative electron when moving with a velocity much less than that of light.

Electronic ratio.—(e/m_o). Ratio of electronic charge to electronic mass.

Electrostatic unit of quantity of electricity.—*See* Quantity of electricity.

Elongation.—Distance of an oscillating, or of a revolving, body from a point of reference; *e.g.*, the distance of an electron from the nucleus about which it revolves.

Emissivity.—Ratio of radiance of the body to that of a black body at same temperature. If radiation of only one wave-length is considered, it is **monochromatic emissivity**; if all wave-lengths, it is **total emissivity.** The ratio of the radiances (or of the emissivities) of two non-black bodies is called **relative emissivity** of first with respect to second.

English sperm candle.—*See* Sperm candle.

Equation of time.—*See* Time.

Equator.—1. The intersection of surface of the **earth,** or other rotating spheroid, with the plane through its center perpendicular to its axis of rotation. 2. The intersection of the **surface** of a **spheroid** with a plane through its center and perpendicular to any diameter chosen as axis. 3. **Celestial equator.** *See* Celestial sphere.

Equinox.—*See* Celestial sphere.

Equivalent.—(equiv). Electrochemical equivalent (briefly equivalent) of an ion—actual or potential—is its formula weight divided by its valence.

Erg.—[force · distance], $[ml^2/t^2]$. Work done by a force of one dyne while acting through a distance of one centimeter in its own direction.

Erg-second.—[work · time], $[ml^2/t]$. The action produced by one dyne acting through one cm in one sec.

Expansion, coefficient of.—*See* Expansivity.

Expansivity.—$[T^{-1}]$. 1. **Volume expansivity** = $dv/(vdT)$. 2. **Linear expansivity** = $dl/(ldT)$. v, l, T = volume, length, temperature; $dv[dl]$ is change in $v[l]$ produced by change dT in temperature.

Fahrenheit.—(F). A thermometric system in which 32° denotes the freezing, and 212°, the boiling point of water under pressure of A_n.

Farad.—Capacity of electrical condenser which is charged to a potential difference of one volt by one coulomb.

Faraday.—(**F**). A subsidiary unit, the electrical charge carried in electrolysis by one gram-equivalent.

Field.—The field of a physical quantity is the region of space within which phenomena characteristic of the quantity exist. The strength, or intensity, of the field at any point is measured by the magnitude at that point of some chosen, characteristic phenomenon, and the complete designation of the field includes an indication of this phenomenon; *e.g.*, electrical field of force. As force is the phenomenon most frequently chosen, and in other cases the context indicates what is intended, the explicit designation of the chosen phenomenon is quite frequently omitted.

Field intensity.—The strength, or intensity, of a field of force at any point is df/dm, where df is the mechanical force experienced by dm, a vanishingly small amount of m placed at that point. For an **electrical field,** m is positive electricity; for a **magnetic field** it is a north magnetic pole; for a **gravitational field** it is mass. Magnetic field strength is frequently called **magnetizing force.**

Fluidity.—(φ). Reciprocal of viscosity. Also called **coefficient of fluidity.**

Flux.—1. Flux (ψ) of **vector** (V) through surface S is $\psi = \int_S V_n dS$; V_n = component of V normal to dS, integral is to be taken over S. 2. Flux of a **quantity** Q through surface is $\psi = dQ/dt$,

dQ = amount of Q which passes through S in time dt. 3. **From point source.** If $V = I/r^2$, where r = distance from source and I is a constant independent of direction, I is called **intensity of the source**, and $\psi = I\omega$; ω = solid angle subtended, at the source, by S (*cf.* Intensity, luminous).

Flux, Luminous.—(ψ). Flux of radiant energy expressed in terms of its power to produce luminous sensation in the human eye.

Flux, Magnetic.—Flux of magnetic induction.

Foot-candle.—$[\psi/l^2]$. Unit of illumination, one lumen per square foot.

Foot-lambert.—$[\psi/l^2\omega]$. Unit of brightness; *see* Lambert.

Foot-pound.—$[ml^2/t^2]$. Work required to raise one pound a vertical distance of one foot, where g = 980.665 cm/sec² (*cf.* meter-kilogram).

Foot-poundal.—$[ml^2/t^2]$. Work done by force of one poundal (*q.v.*) acting through a distance of one foot.

Force.—$[ml/t^2]$. That which imparts acceleration to material bodies.

Force, Electromotive.—*See* Potential.

Force, Magnetizing.—*See* Field intensity.

Force, Magnetomotive.—*See* Potential.

Force de cheval.—*See* Cheval-vapeur.

Frequency.—(ν). $[N/t]$. Number per unit of time. In case of vibrations, waves, etc., the frequency is the number of complete vibrations, of complete waves, etc., per unit of time.

Gamma.—(γ). $[\sqrt{m/\mu l t^2}]$, $[\sqrt{ml\epsilon/t^4}]$. A unit of magnetic field intensity; 0.000 01 gauss.

Gas constant.—1. (R). [work/mass-degree], $[l^2/t^2T]$. The coefficient R in the ideal gas equation $pv = RTm$; p = pressure, v = volume of the mass m at absolute temperature T. 2. (R). [work/mole-degree]. **Gas constant per mole** obtained by expressing m in moles. 3. (k). [work/molecule-degree], $[ml^2/t^2T]$. **Boltzmann's molecular gas constant**: obtained by expressing m in terms of number of molecules.

Gas, Ideal.—One which strictly satisfies the equation ($pv = RTm$) and other relations deduced from the classical kinetic theory of gases on the assumption that the molecules are infinitely small and devoid of mutual attraction.

Gauss.—$[\sqrt{m/\mu l t^2}]$, $[\sqrt{ml\epsilon/t^4}]$. The cgsm unit of magnetic field intensity.

Gaussian gravitation constant.—The square root of the intensity of the gravitational field of force of the sun at a point whose distance from the sun is the astronomical unit of length (*cf.* Gravitation constant).

Geepound.—*See* Slug.

Gilbert.—$[\sqrt{ml/\mu t^2}]$, $[\sqrt{\epsilon m l^3/t^4}]$. Electromagnetic unit of magnetic potential, of magnetomotive force. Unless contrary is indicated, it is the cgsm unit. In precise work, the International gilbert, based upon the Int. elec. units, should be distinguished from the absolute, or cgsm, gilbert.

Grade.—$[\theta]$. Unit of plane angle, $\frac{1}{400}$ of complete circumference.

Gram atom.—*See* Mole.

Gram calorie.—*See* Calorie.

Gram equivalent.—*See* Mole.

Gram formula weight.—*See* Mole.

Gram weight.—*See* Weight.

Gravitation constant.—(G). $[l^3/mt^2]$. The coefficient G occurring in the equation $f = G\,(mm')/r^2$; f = force of gravitational attraction between two point masses (m, m') in vacuo, r = distance between m and m' (*cf.* Gaussian gravitation constant).

Gravity, Acceleration of.—(g), (g_s). $[l/t^2]$. Unless the contrary is indicated, this expression refers specifically to the earth, and denotes the resultant acceleration downward experienced by a freely falling body placed at the point considered. It includes centrifugal effects arising from the rotation of the earth, as well as the effects of gravitational attraction (*cf.* Gravity, standard).

Gravity, Specific.—*See* Specific gravity.

Gravity, Standard.—(g_s). $[l/t^2]$. Standard gravity is the value adopted by the International Committee on Weights and Measures as the "accepted" value of the acceleration of gravity to which all measurements involving this quantity are to be referred. Thus a pressure of x cm of mercury at t°C is to be understood as denoting the pressure exerted by x cm of mercury at t°C at a place where the acceleration of gravity is g_s. The accepted value is g_s = 980.665 cm/sec² (= 32.174 ft./sec²).

Heat.—1. By the **heat of a process** is meant the amount of heat evolved, per unit quantity of material involved, during the isothermal process, the process proceeding in the direction indicated. The quantity of material may be expressed in terms of mass, of moles, of equivalents, etc., as may seem desirable. 2. By the **latent heat** of a transformation is meant the amount of heat absorbed per unit quantity of material transformed, the transformation proceeding in the direction indicated. Latent heat of transformation of A to B = −(heat of transformation of A to B) = heat of transformation of B to A.

Heat diffusivity.—*See* Diffusivity.

Heat, Specific.—*See* Capacity, and Specific heat.

Hecto-.—Prefix denoting 100.

Hefner unit.—A superseded unit of luminous intensity; approximately = 0.9 Int. candles.

Henry.—$[\mu l]$, $[t^2/\epsilon l]$. Unit of electromagnetic inductance. Defined as that inductance for which an induced electromotive force of one volt is produced when the inducing current is changed at the uniform rate of one ampere per second.

Horsepower.—(h.p.). [work/time], $[ml^2/t^3]$. 1. (HP) **Primary definition** of the term is work done at the rate of 550 foot-pounds per second. 2. For electrical purposes it is regarded as exactly = 746 watts, which is frequently called the **electrical horsepower.** 3. **Continental horsepower.** *See* Cheval-vapeur.

Humidity.—1. **Absolute humidity** of a gas is the actual amount of water vapor per unit volume of the gas. Usually expressed in terms of the actual pressure of the water vapor present. 2. **Relative humidity** of a gas = ratio of the pressure of water vapor present to the pressure of water vapor which is in equilibrium with water at the same temperature. 3. **Dew-point of a gas** is the temperature at which the pressure of water vapor in equilibrium with water is equal to the actual pressure of the water vapor contained in the gas. If the temperature of the gas be varied while its absolute humidity remains unchanged, then the dew-point is that temperature at which the relative humidity is 100%. 4. If the bulb of a thermometer be encased in a fabric which is kept wet with water (**wet-bulb**), the thermometer will record a lower temperature than if the bulb were dry (**dry-bulb**). If the circulation over the wet bulb is sufficiently rapid, the difference in the temperatures depends solely upon the total pressure of the gas, its absolute humidity, and its temperature. Hence the humidity of the atmosphere, or of any other very large volume of gas, can be readily determined by the use of wet- and dry-bulb thermometers.

Hydrometer.—An instrument which, by the extent of its submergence, indicates the specific gravity of the liquid in which it floats. Frequently, its readings are expressed in degrees (°). Various systems of graduations are in use, *see* p. 31.

Hygrometric.—Pertaining to humidity of atmosphere.

Hypsometry.—The art of measuring the elevation above sea-level. More specifically, the use of the boiling-point of water for such measurements.

Ice point.—(T_0). Temperature at which water freezes when under the pressure of one normal atmosphere.

Ideal gas.—*See* Gas, ideal.

Illumination.—$[\psi/l^2]$. The illumination at a point of a surface is the surface density of the luminous flux incident at that point.

Inch of water *[of mercury, etc.] at $t°$.—Analogous to cm of water (q.v.)*

Index of absorption. *—See Absorption.*

Index of refraction. *See Refraction.*

Inductance.—The electrical inductance of circuit A with reference to circuit B is ψ_A/I_B; ψ_A = flux of magnetic induction through A as a result of the current I_B in B. A and B may be the same circuit.

Induction.—1. That **modification** which is acquired by a medium when it becomes the seat of a field of force, and which is evidenced by the fact that its boundaries with other media exhibit distinctive properties which they do not possess in the absence of the field. 2. The distinctive **properties** mentioned in (1); as in magnetization by induction, induced electric charges, etc. 3. **Electrostatic induction.** $[\sqrt{m/\mu l^3}]$, $[\sqrt{\epsilon m/lt^2}]$. ϵF, ϵ = dielectric constant, F = intensity of electrostatic field of force. **Electric displacement** = $\epsilon F/4\pi$. 4. **Magnetic induction** (B). $[\sqrt{\mu m/lt^2}]$, $[\sqrt{m/\epsilon l^3}]$. $B = \mu H$, μ = magnetic permeability, H = intensity of magnetic field of force. 5. **Electromagnetic induction** is the phenomenon which is characterized by the appearance, in every circuit, of a cyclical emf which is proportional to the rate of change of the flux of magnetic induction through that circuit.

Intensity coefficient.—*See* Black body.

Intensity, Field.—*See* Field intensity.

Intensity, luminous. 1 Of a **point source in a given direction** = amount of luminous flux, per unit of solid angle, which the source emits in the direction considered. 2. Of a **point of an extended source** = brightness of that point of the source; also called intrinsic brightness. 3. Of an **extended source, in a given** direction, is its intensity at a point so distant in the stated direction that the source may be regarded as a point. For nearer points the **apparent intensity** will depend upon the distance, and is defined as the intensity of that point source which at the same distance will produce the same illumination (*cf.* flux).

Intensity of magnetization.—*See* Magnetization.

Intensity of radiation. 1 The intensity of the **radiation emitted** in a specified direction by a body is the amount of radiant energy emitted in that direction, per unit of time, per unit of area, and per unit of solid angle of emission. For spectral, or monochromatic, intensity, *See* Radiance. 2. Of **received radiation,** *See* Irradiation. 3. Of **radiation in transit.** The amount of radiant power per unit area which passes through an element of area which is normal to the direction of propagation; this equals the volume density of radiant energy at the point considered.

International electrical units.—A system of electrical and magnetic units based upon the ohm, the ampere, and secondarily upon the volt, all as realized by certain concrete standards which have been internationally agreed upon, and upon the cgs units for such other quantities as may be involved. The concrete standards have been so chosen as to make the international system nearly identical with the practical system; as now defined, the outstanding discrepancy in no case exceeds 52 parts in 100 000. In distinguishing between the two systems, the units of the practical system are described as absolute, those of the other, as international. The introduction of the volt as a secondary unit defined by a concrete standard (Weston normal cell = 1.018300 Int. volts at 20°C) introduces confusion when measurements of high precision are to be recorded. In these Tables, values based upon the Int. ohm and the Int. ampere (as defined by the silver voltameter) are denoted by (a). Those based on the Int. ohm and the Int. volt (as defined by the standard cell) are denoted by (v).

Irradiation.—The radiant power, per unit of area, incident upon a surface.

Joule. *—$[ml^2/t^2]$. 1.* ***Absolute joule*** *= 10^7 ergs. 2.* ***International joule*** *= work expended per second by an Int. ampere in an Int. ohm.*

Karat.—(K). Denotes the "fineness of gold" in terms of parts (by weight) of gold per 24 parts of the alloy. Twenty-four g of an n karat alloy contains n g of gold, the alloy is "**n carats fine.**"

Kelvin.—(K). Name applied to the absolute centigrade scale of temperature.

Kilo-.—Prefix denoting 1000.

Kilogram calorie.—*See* Calorie.

Kilogram-meter.—A torque equivalent to that of one kilogram weight acting on a lever-arm one meter long.

Kilowatt-hour.—Work expended by one kilowatt in one hour. In Great Britain it is quite generally called **Board of Trade unit** (B.T.u.).

Kinematic viscosity.—$[l^2/t]$. Ratio of viscosity to density.

Lambert. $[\psi/l^2\omega]$. The brightness of a surface which, radiating in accordance with Lambert's law, emits a total luminous flux of one lumen per cm². For such a surface, brightness is independent of direction of the line of sight and equals $1/\pi$ lumen, per steradian, per cm² = $1/\pi$ candles per cm². If the total emission is one lumen per sq. ft., the brightness is called one **foot-lambert.**

Lambert's law.— $I = I_0\cos\theta$; $I_0[I]$ = intensity of radiation emitted in direction normal [at angle θ with normal] to the surface. In many cases this law does not express the facts.

Latent heat.—(l, L). *See* Heat.

Latitude.—(lat.). 1. The angular distance of a point from the equator of a **spheroid,** measured along a great circle passing through the poles. 2. **Celestial latitude.** *See* Celestial sphere.

Legal ohm.—A unit of resistance; so designated by the International Conference of 1884, and defined as the resistance of a column of mercury 1 mm² in cross-section and 106 cm in length at the temperature of melting ice. It was never legalized.

Light-year.—Distance traveled by light in free space in one year.

Line.—Unit of flux of magnetic induction = one maxwell.

Liter-atmosphere.—The amount of external work done when a volume is increased by one liter against an external pressure of one atmosphere.

Longitude. (long.). 1. The longitude of a point is the angle which its axial plane makes with a fiducial one. For the **earth,** angles measured from the fiducial plane towards the west are usually considered positive. 2. **Celestial** or **astronomical** longitude. *See* Celestial sphere.

Loschmidt's number.—(n_0). $[l^{-3}]$. Number of molecules per unit volume of an ideal gas at 0°C and pressure A_n.

Lumen.—$[\psi]$. Fundamental unit of luminous flux. A uniform point source of one candle emits 4π lumens.

Luminous flux.—*See* Flux, luminous.

Luminous intensity.—*See* Intensity, luminous.

Lunar month.—The time which elapses between successive new moons. Also called synodical month.

Lux.—A unit of illumination, one lumen per square meter.

Magnetic flux.—*See* Flux, magnetic.

Magnetic induction.—*See* Induction.

Magnetic moment.—*See* Moment.

Magnetization, Intensity of.—Magnetic moment per unit of volume (*cf.* moment).

Magnetomotive force.—(mmf). *See* Potential.

Magnitude.—The **magnitude,** or **apparent magnitude,** (m) of a star is primarily an indication of the amount of light the earth receives from it. The value to be assigned to the latter depends upon the characteristics of the perceptive apparatus: visual, photovisual, photographic, and radiometric magnitudes are to be distinguished. Certain stars near the north pole have been chosen as standards; the numerical magnitudes assigned to them are such as represent satisfactorily the range covered by early naked-eye estimates, and satisfy the equation $m = 2.5 (\log_{10} I_0 - \log_{10} I)$, I = intensity of light from a star of magnitude m, and I_0 = that from one of magnitude zero. For Vega, $m = 0.2$; a star of $m = 6$ is near the limit of naked-eye visibility. The **absolute magnitude** M is internationally defined as the apparent magnitude the star would have if its distance were 0.1 parsec; $M = m + 5 + 5 \log_{10} \pi$, π = parallax expressed in $''$.

Mass, Engineers' unit of.—*See* Slug.

Maxwell.—The cgsm unit of flux of magnetic induction.

Mean distance.—In astronomical parlance, the mean distance of a planet from the sun denotes the mean of the greatest and the least distance from the sun to the path of the planet. Similarly in other cases.

Mean spherical candlepower.—Average candlepower of a source, in all directions.

Mega-.—Prefix = 1 000 000.

Megmho.—Conductance of one reciprocal microhm.

Meter-candle.—The illumination of an element of surface one meter distant from a uniform source of one candle situated upon the normal to the center of the element. One lux.

Meter-kilogram.—$[ml^2/t^2]$. Work required to raise one kilogram a vertical distance of one meter at a place where the acceleration of gravity is 980 665 cm/sec.^{2}

Mho.—An electrical conductance of one reciprocal ohm.

Micro-.—Prefix denoting $1/10^6$.

Microhm.—10^{-6} ohm.

Micromicro-.—Prefix denoting $1/10^{12}$

Micron.—(μ). Unit of length = $1/10^6$ m = 0.001 mm.

Mil.—0.001 in. (*cf.* Circular inch).

Milli-.—Prefix = 0.001.

Millimicro-.—Prefix = 0.000 000 001.

Minute.—1. (min). **Time,** $^1/_{1440}$ of a day. 2. ($'$). **Unit of angle,** $^1/_{60}$ degree. 3. ($^\backprime$). **Centesimal minute** = unit of angle = 0.01 grade.

Modulus.—1. *See* Elastic modulus. 2. For the several elastic moduli—bulk, compression, elasticity, rigidity, torsion, Young's—*see* distinguishing name.

Mohs.—An arbitrary scale of hardness based upon a selected list of 10 native minerals.

Mole.—A variable, derived unit of mass; its mass is numerically equal to the molecular weight of the substance measured. The expressions **gram-mole, kilogram-mole,** etc. are used to designate the basic unit of mass employed. Similarly derived units based upon the atomic weight, the formula weight, or the equivalent are called the **gram-atom, gram-formula weight** or **gram-equivalent** when the gram is the basic unit, and correspondingly in other cases.

Molecular.—For molecular properties, *see* appropriate properties.

Molecular volume.—Volume occupied by one mole. Molecular weight divided by density.

Molecular weight.—(M). The sum of the atomic weights of all the atoms contained in a molecule.

Moment.—1. Of **force** (F) about a point = Fl, l = perpendicular distance from the point to the line of F. 2. Of a **couple** = product of either force times perpendicular distance between them. 3. Of a **magnet** = moment of couple acting upon it when it is at right angles to a magnetic field of unit intensity. 4. Of **inertia** about an axis = sum of the products of each element of mass times the square of its distance from the axis.

Month.—1. Period of time determined by motion of **moon.** *See* lunar, synodical, tropical, sidereal, anomalistic, nodical, draconic. 2. **Solar month** = $^1/_{12}$ of tropical year. 3. **Calendar month** = conventional subdivision of year.

Myria-.—Prefix = 10 000.

Node.—1. A point of a **standing wave** where the displacement is independent of the time. 2. In **astronomy,** the points where an orbital, or other, plane cuts the ecliptic; the **rising node** is the one at which the passage across the plane of the ecliptic is from south to north.

Nodical month.—Time required by the moon to pass from one rising node to the next. Also called **draconic month.**

Noon.—*See* Time.

Normal.—1. The normal to a **surface** is a line drawn perpendicular to the surface at the point considered. 2. Any **line** perpendicular to another may be said to be normal to it. 3. A **concentration** of one gram-equivalent per liter.

Normal atmosphere.—(A_n). *See* Atmosphere.

Numeric.—(N). A pure number. A dimensionless quantity.

Nutation.—*See* Celestial sphere.

Oersted.—The cgsm unit of magnetic reluctance.

Ohm.—(Ω). A unit of electrical resistance. 1. **Absolute ohm** = 10^9 cgsm units. 2. **International ohm** is the resistance, at the temperature of melting ice, offered to an unvarying electric current by a column of mercury, of constant sectional area, having a mass of 14.4521 grams and a length, at the temperature mentioned, of 106.300 cm.

Ohm-centimeter.—Unit of electrical volume resistivity. The resistivity of a material of which a uniform bar one cm^2 in sectional area has a longitudinal resistance of one ohm per cm of length. Frequently called one **ohm per centimeter cube.**

Ohm (cm, gram).—Unit of electrical mass resistivity. The resistivity of a material of which a bar, having such a uniform section that its mass per linear cm is one gram, has a longitudinal resistance of one ohm per cm of length.

Ohm (meter, mm).—Unit of electrical volume resistivity. The resistivity of a material of which a circular cylinder one mm in diameter has a longitudinal resistance of one ohm per meter.

Ohm (meter, mm^2).—Unit of electrical volume resistivity. The resistivity of a material of which a circular cylinder one square mm in sectional area has a longitudinal resistance of one ohm per meter.

Ohm (mil, ft.).—Analogous to ohm (meter, mm). Cylinder one mil in diameter, resistance of one ohm per foot.

Ohm (mile, pound).—Analogous to ohm (cm, gram).

Ohm-inch.—Analogous to ohm-centimeter.

Parallax.—1. The **annual parallax** of a star is defined as the maximum angle subtended by one astronomical unit of length at the distance of the star from the sun. 2. The **equatorial horizontal parallax** of a member of the solar system is the maximum angle subtended by the equatorial radius of the earth at the distance of the earth from the member considered.

Parsec.—The distance of a star for which the annual parallax is one second of arc.

Pentane candle.—A superseded unit of luminous intensity = one Int. candle.

Percent.—(%). The number of units of the constituent in 100 units of the mixture containing it. If units of volume are used, the ratio is called **volume percent;** if units of mass, it is called **mass percent, weight percent,** or simply **percent.** (% must be distinguished from ‰ which is frequently used to denote per thousand.)

Perigee.—That point of the moon's orbit which is nearest to the earth (*cf.* apogee).

Perihelion.—That point of a planet's, or comet's, orbit which is nearest to the sun (*cf* aphelion).

Permeability.—(μ.) The force (f) of repulsion between two rigidly magnetized poles (m, m') at a distance r apart is $f = (mm')/(\mu r^2)$; μ depends upon the material in which the poles are immersed, and is called its permeability.

Pferdekraft.—*See* Cheval-vapeur.

Phot.—An illumination of one lumen per cm^2.

Photoelectric constant.—1. **h/e.** It is $1/\nu$ of the rise in potential required to impart to a negative electron the energy it has when emitted under the action of radiation of frequency ν. 2. **hc/e.** This is λ times the rise in potential mentioned in (1). λ = wave-length in vacuo.

Planck's constant of action.—(**h**). $[ml^2/t]$. A universal constant which fixes the amount of energy contained in the individual bundles, or quanta, of radiation emitted by a radiating body. Each such bundle contains an amount of energy = $\mathbf{h}\nu$, ν = vibration frequency of the radiation. **h** is also called **Planck's quantum.**

Poise.—$[m/lt]$. The cgs unit of viscosity. If the tangential force, per unit area, which one layer of a fluid exerts upon an adjacent one is one dyne when the space rate of variation of the tangential velocity from layer to layer is unity, the viscosity of the fluid is one poise.

Poisson's ratio.—If a bar of uniform section be subjected to a pure tensile stress, the ratio of its transverse contraction per unit of transverse thickness to its elongation per unit of length is called the Poisson's ratio of the material.

Pole strength.—*See* Quantity of magnetism.

Poncelet.—Unit of power = 100 meter-kilograms per second.

Potential.—The excess of the potential at the point A over that at B, with reference to any quantity m, is the mechanical work per unit of m which must be done in carrying a very small positive amount of m from B to A. The difference in electrical potential is called **electromotive force, emf, potential difference**; in magnetic potential, is called **magnetomotive force, mmf.**

Potential gradient.—The space rate of increase in the potential. If the direction in which the rate to be measured is not stated, that corresponding to the maximum gradient is to be understood.

Pound weight.—*See* Weight.

Poundal.—The unit of force in the fps system. It is the force which, if acting continuously upon a mass of one pound, will impart to it a uniform acceleration of one foot per second^2 (*cf.* Dyne).

Power.—1. The time **rate of doing work.** 2. If when the two junctions of a bimetallic circuit differ in temperature by a small amount (dt), there is an open circuit emf (dE) around the circuit, then $(dE)/(dt)$ is called the **thermoelectric power** of the circuit, corresponding to the average temperature of the two junctions. 3. The **ability** to do some specific thing; as in rotatory power.

Practical electric units.—A system of electrical units based upon 10^9 cm, 10^{-11} gram, sec, and the permeability of a vacuum, as fundamental units. The units of most interest are the ohm ($=10^9$ cgsm), ampere ($=0.1$ cgsm), and volt ($=10^8$ cgsm). Frequently described as absolute (*cf.* Int. elec. units).

Precession of the equinoxes.—*See* Celestial sphere.

Pressure.—(p), (P). $[m/lt^2]$. Normal force per unit of area. A **hydrostatic pressure** is a pressure which is the same in all directions. For critical pressures, *see* Critical.

Quadrant.—1. Unit of **angle** = 90°. 2. Formerly used occasionally to denote the **henry.**

Quantity of electricity.—1. (es). The **electrostatic unit** is that quantity which when concentrated to a point and placed at unit distance from an equal point charge will exert upon it a unit force, the surrounding medium being a vacuum. 2. (em). The **electromagnetic unit** is that quantity which is transferred per unit of time across any section of an infinitely long, straight, linear conductor when the current is such that the intensity of the resulting magnetic field at unit distance from the conductor is unity. 3. For **other units**—coulomb, electronic charge, faraday—*see* corresponding names.

Quantity of magnetism.—Also called **pole strength.** 1. The **electromagnetic unit** is that quantity which when concentrated to a point pole and placed at a unit distance from an equal point pole will exert upon it a unit force, the surrounding medium being a vacuum. 2. The **electrostatic unit** is that quantity which when concentrated to a point pole and placed at a unit distance from an infinitely long, straight, linear conductor would experience a unit force as a result of a current in the conductor such that one electrostatic unit of electricity per second is transferred across each section of the conductor. 3. The **Int. electric unit** is not named, it is the same as the cgsm unit.

Quantum.—1. Certain processes are essentially discrete, and consequently parcel out into bundles the several quantities involved. If for a certain quantity and a particular process these bundles are all alike, it is now customary to call them quanta, without implying that the quantity so bundled has in itself any atomistic properties. 2. **Planck's quantum.** *See* Planck.

Radian.—An angle which encloses, of the circumference of a concentric circle, an arc = radius.

Radiance.—The radiance of a body, within the spectral range λ_1 to λ_2, is defined as the intensity of the radiant energy, having wave-lengths lying between λ_1 and λ_2, which the body emits in a direction perpendicular to its radiating surface. If the spectral range is not mentioned, all wave-lengths are to be included; this is frequently called the **total radiance.** The **spectral, or monochromatic, intensity** of the radiance of wave-length λ is defined as the ratio of the radiance within the range $(\lambda - \frac{1}{2}d\lambda)$ to $(\lambda + \frac{1}{2}d\lambda)$ to $d\lambda$, when the latter is indefinitely small (*cf.* Emissivity).

Radiation constants.—*See* Black body.

Rankine.—A name sometimes applied to the absolute Fahrenheit scale of temperature.

Réaumur.—(R). A thermometric system in which the freezing point of water is called 0°, and the boiling point, 80°.

Reflectivity.—The ratio of the intensity of the light specularly reflected from a surface to the intensity of the light incident upon it. It is a pure numeric.

Refraction.—1. The **index of refraction, refractive index,** or **refractive exponent** is $n = \sin i/\sin r$; i = angle of incidence from a vacuum upon the substance, and r = angle of refraction, each measured from the normal to the surface. 2. **Refractivity** is $(n - 1)$. 3. **Specific refractivity** (r_G) is $(n - 1)/d$. **Specific refraction** (r_L) is $(n^2 - 1)/d(n^2 + 2)$. d = mass per unit of volume. 4. **Molecular refractivity** = Mr_G. **Molecular refraction** = Mr_L. M = molecular weight. By replacing M by the atomic weight, the corresponding **atomic values** are obtained. 5. **Refractive constant** of a solute is its specific refractivity computed on the assumption that the refractivity of the solution is equal to the sum of the refractivities of its pure constituents each multiplied by the ratio of its mass per unit volume of the solution to its own density when pure.

Reluctance.—The magnetic reluctance of a body between two specified equipotential surfaces is the ratio of the difference in the two potentials divided by the flux of magnetic induction from [to] either surface to [from] the body. It has no significance unless these two fluxes are the same.

Resistance.—1. The **electrical resistance** of a body between two specified equipotential surfaces is E/I, where E is the unchanging difference in the potentials of the surfaces and I is the resulting current across any transverse section between them. 2. **Specific resistance.** *See* Resistivity.

Resistivity.—1. [resistance × length]. **Resistivity,** or **volume resistivity,** of a substance is the longitudinal resistance per unit of length of a uniform bar of the substance of unit sectional area. 2. [resistance × mass/(length)^2]. **Mass resistivity** of a substance is the longitudinal resistance per unit of length of a uniform bar of the substance of such a sectional area that it contains one unit of mass per unit of length. 3. [resistance] **Surface resistivity** is the resistance per unit of length of a strip of the surface of unit width. It has reference solely to the current which is restricted to the surface.

Rhe.—Name proposed for cgs unit of fluidity; = one reciprocal poise.

Right ascension.—*See* Celestial sphere.

Rigidity.—If to the four faces of a cube which are parallel to a given edge there be applied tangential stresses which are equal in absolute value, perpendicular to the given edge, and so directed as to produce a pure distortion, the other two faces will be deformed into diamond shaped figures if the material is isotropic. The modulus of rigidity is defined as the quotient of the stress on any one of the faces divided by the resulting change in any one of the angles of a distorted face. Also called **modulus of shear, Coulomb's modulus, modulus of torsion** (the last is undesirable).

Rotation.—*See* Rotatory power.

Rotatory power, Optical.—1. The **natural rotatory power** is θ/l, where θ is the rotation of the plane of polarization which occurs in a path of length l. The **specific rotatory power** ($[\alpha]$) is θ/dl, d = density. The **molecular** [or **atomic**] **rotatory power** is $M\theta/dl$ [or $A\theta/dl$]; M = molecular, A = atomic weight. 2. The **magnetic rotatory power** is $\theta/(lH \cos \alpha)$, where H = intensity of the magnetic field and α = angle between H and the path of the light. It is commonly called **Verdet's constant.** From the magnetic rotatory power, the **specific** ($[\omega]$), **molecular,** and **atomic magnetic rotatory powers** are derived exactly as in the case of natural rotation. The ratio of any one of these quantities to the corresponding one for a chosen reference substance is called the **relative power.** Water is the reference substance commonly chosen, and $[\Omega]$ is used to denote the molecular magnetic rotatory power relative to water.

Rydberg's fundamental frequency, and series constant.—*See* Series, spectral.

Secohm.—A superseded name for the henry.

Second.—1. (sec). **Time,** $^1/_{86400}$ day. Mean solar day, unless contrary is indicated. 2. (″). Unit of **angle,** $^1/_{3600}$ degree. 3. (‵). **Centesimal second** = 0.0001 grade.

Seger cone.—One of a graded series of cones of refractory material which, by their softening and the resultant deformation, indicate the heat treatment to which they have been subjected.

Series, Spectral.—Spectral lines, or groups of lines, which occur in orderly sequence. Most of these sequences can be represented by an equation of the form $\frac{1}{\lambda} = A - \frac{BN}{(m + \alpha + \beta/m^2)^2}$; λ = wave-length in vacuo; m is an integer varying from one line (or group) to another; for any one series, A, B, N, α and β are constants; B is an integer; N is known as **Rydberg's constant,** its value is determined by the constitution of the radiating atom. On Bohr's theory, $N = N_\infty \frac{M}{M + \mathbf{m}_0}$, where M = mass of the atom, $\mathbf{m}_0$ = electronic mass, and $N_\infty = 2\pi^2\mathbf{m}_0\mathbf{e}^4/\mathbf{h}^3\mathbf{c}\epsilon_0{}^2$; N_∞ is known as **Rydberg's universal series constant; e** = electronic charge; **h** = Planck's constant; ϵ_0 = dielectric constant of vacuum; **c** = velocity of light in vacuo. On this theory, B denotes the number of electrons displaced from their normal positions, m is the **principal quantum number,** α depends upon the subordinate, or **azimuthal, quantum number,** and $\beta = 0$. For atoms of the type of hydrogen, $\alpha = 0$, $\beta = 0$; for others $(m + \alpha + \beta/m^2)$ is frequently called the **effective quantum number,** generally it is not an integer. **Rydberg's fundamental frequency** is $\nu_\infty = \mathbf{c}.N_\infty$.

Sidereal month.—The time required for the moon to complete one apparent circuit among the stars.

Siemens unit.—(S.E.). A superseded unit of electrical resistance proposed in 1860 by Werner von Siemens; defined as the resistance at 0°C of a column of mercury one meter long and of a uniform cross section = one mm^2.

Slug.—A unit of mass. 1. The mass which will acquire an acceleration of one foot per sec^2 when continuously acted upon by a force of one pound weight. Also called **geepound,** and **engineer's unit of mass.** 2. The **metric slug** is the mass which will acquire an acceleration of one meter per sec^2 when continuously acted upon by a force of one kilogram weight.

Solar month.—$^1/_{12}$ tropical year.

Solubility.—1. By solubility of the **non-gas** a in b is meant the mass of a per unit mass of b which is contained in the mixture which is in equilibrium with an excess of a. In this mixture b is said to be saturated with a. Data are frequently restricted to mass of a per unit mass of mixture, mass of a per unit volume of mixture, or moles of a per mole of mixture. 2. **Solubility of a gas** is C_s/C_g, C_s = concentration of gas in the solution, C_g = concentration of gas in overlying gas phase. 3. **Solubility product** of an ionized substance (A_nB_m) in a stated solvent = $[A]^n \cdot [B]^m$, where $[A]$ and $[B]$ denote the concentrations of the two ions when the solution is saturated with the substance.

Specific gravity.—($d^{t_2}_{t_1}$). The ratio of the mass of a certain volume of the substance at the temperature t_2 to that of the same volume of a reference substance (usually water) at temperature t_1. Frequently, but incorrectly, called density.

Specific heat.—1. **Heat capacity.** *See* Capacity. 2. **Specific heat of electricity.**—*See* Thomson effect. 3. **Einstein's specific heat constant** (β) = ratio of Planck's constant (**h**) to Boltzmann's molecular gas constant (k_0). 4. **Ratio of specific heats** = $\gamma = c_p/c_v$; c_p, c_v = specific heat at constant pressure and at constant volume, respectively.

Specific inductive capacity.—The ratio of the dielectric constant of the substance to that of a vacuum.

Specific refractive power.—Used indifferently to denote several of the refractive constants (*cf.* Refraction).

Sperm candle, English.—A superseded unit of luminous intensity = one Int. candle.

Spheradian.—*See* Steradian.

Spherical candlepower, Mean.—*See* Mean spherical candlepower.

Square.—(sq.), (^{2}). Used in conjunction with the name of a unit of length to form the name of a related unit of area; *e.g.,* square foot (sq. ft.), (ft.^{2}) is the name of a unit of area equivalent to the area of a square with edges one foot long.

Square degree.—The solid angle enclosed by a cone of vanishingly small vertex angle 2θ is $k\pi\theta^2$. If θ is expressed in radians and the unit of solid angle is so chosen that $k = 1$, that unit is called a **steradian.** If θ is expressed in degrees, and $k = 1$, the corresponding unit of solid angle is called a **square degree.** One square degree = $(\pi/180)^2$ steradians. This procedure defines a definite unit of solid angle although the solid angles enclosed in cones of finite vertex angles are not proportional to the squares of those angles.

Stefan's constant.—*See* Black body.

Steradian.—The solid angle which encloses on the surface of a concentric sphere an area = (radius)^2.

Stoichiometric.—Pertaining to the ratio of the masses of the several elements contained in a pure chemical compound.

Strain.—1. For pure distortion the strain is measured by the change in a significant angle. 2. The ratio of change in size to original size.

Stress.—The force per unit of area over which it acts.

Surface tension.—(γ). $[m/t^2]$. Owing to molecular attraction, two fluids in contact adjust themselves so that the area of their interface is a minimum, consistent with other requirements. This adjustment may be pictured as arising from a tension residing in the surface itself; to this is given the name **surface tension.** Its value is defined as the normal, tensile force, per unit of length, across any line traced on the surface.

Susceptibility.—(κ). In the electromagnetic systems of units, $4\pi\kappa$ is the excess of the magnetic permeability of the substance over that of a vacuum.

Synodical.—In astronomy, the synodical period of a body is the interval between its successive returns to the same position with reference to the plane which is perpendicular to the plane of the ecliptic and which continuously passes through the centers of the earth and the sun.

Synonical month.—*See* Lunar month.

Temperature conductivity.—*See* Diffusivity.

Tension, Surface.—*See* Surface tension.

Tenth-meter.—10^{-10} meter; one Ångstrom unit.

Thermal.—*See* Heat.

Thermoelectric power.—*See* Power.

Thomson effect.—In a region in which the temperature of a homogeneous metallic conductor varies from section to section, there exists a potential gradient which is proportional to the product of the temperature and its gradient. This is the Thomson (or Kelvin) thermoelectric effect. The constant of proportionality is called the coefficient of the effect. If the coefficient is positive, a positive electric current flowing from hot section to cooler section tends to make the temperature more uniform; it is as if the current carried heat from hot portion to cooler portion, as if the electricity had a certain specific heat. This is what Thomson called the **specific heat of electricity.** It may be either positive or negative, depending upon the metal.

Time.—**True noon,** or **local true noon,** is the instant at which the sun is bisected by the meridional plane of the observer. **Mean noon,** or **local mean noon,** is the instant at which a fictitious mean sun is bisected by the meridional plane. This **mean sun** is one endowed with such a uniform, apparent angular velocity in the equatorial plane that in one tropical year it will make exactly the same number of apparent revolutions around the earth as are made by the true sun. Time measured from the true noon is called **true, or apparent, solar time;** that from mean noon is called **mean time.** The excess of mean time over true time is called **equation of time.** The earth has been divided into a series of time zones, each 15° of longitude in width, so that intercourse may be facilitated by all places in each zone using the mean time corresponding to the center of the zone; this is known as **standard time.** The first zone is centered on Greenwich, England.

Titer.—*See* Concentration.

Torque.—The moment of a force.

Tropical month.—The yearly average of the time required for the moon to traverse 360° of astronomical longitude.

Twist.—If a uniform bar of free length l be clamped rigidly at one end and the other end be twisted, about the axis of the bar, through an angle θ, the twist of the bar is defined as θ/l. Similarly for other cases.

Units, Systems of.—The fundamental units in most absolute systems are those of mass, length, time, thermometric degree, and the dielectric constant (or the magnetic permeability) of a vacuum. Other units are defined in terms of these by the use of established relations, arbitrary factors being made unity. The most common systems are the centimeter-gram-second-degree Centigrade (cgs), and the foot-pound-second-degree Fahrenheit (fps) systems. *See also* International electric units, practical electric units, and absolute.

Van der Waals.—*See* Waals.

Violle unit.—A superseded unit of luminous intensity based upon the brightness of fused platinum at the temperature of solidification.

Viscosity.—If a fluid is flowing in the plane yz with velocity v it exerts upon an adjacent plane a tangential drag $= \eta(\mathrm{d}v)/(\mathrm{d}x)$, per unit of area. η is called the **viscosity, coefficient of viscosity,** or **coefficient of internal friction.** Unit: poise.

Viscosity, Kinematic.—Viscosity divided by density.

Volt.—The electrical potential difference which, when steadily applied to a conductor having a resistance of one ohm, will produce in it a current of one ampere (*cf.* absolute and international units). The Int. Committee authorized by the London Conference, 1908, agreed to regard the emf of the Weston normal cell at 20°C as exactly 1.0183 Int. volts. This furnishes a subsidiary definition which is slightly discordant with the primary one. These tables distinguish between the two, and between units derived from them, by using (a) to denote those based on ampere and ohm, and (v) to denote those based on volt as defined by the Weston cell.

Volt-electronic charge.—Analogous to volt-faraday.

Volt-faraday.—The work which must be done in order to transfer one faraday of positive electricity from any point to another having a potential one volt higher than the former.

Volt-second.—Unit of flux of magnetic induction. The amount defined by the change per second, of the magnetic induction through an area, required to induce around the area an emf of one volt.

Volume, Specific.—Reciprocal of the density.

Waals, Van der.—In the equation $(p + a/v^2)(v - b) = 1 + \alpha t$, a and b are known as Van der Waals' constants; $a[b]$ = pressure [volume] constant.

Watt.—Unit of power; work done at rate of one joule per second.

Watt-hour.—Work expended by one watt in one hour (*cf.* kilowatt-hour).

Wave-length.—(λ). Distance between consecutive corresponding points in a monofrequent wave train. Occasionally applied to complex waves.

Wave number.—Reciprocal of wave-length.

Weight.—The force with which a body, left to itself, is urged towards the earth. In the absolute systems of units it is numerically equal to the mass of the body multiplied by the acceleration of gravity (g) at the position considered; hence varies with position. Such expressions as **gram weight [pound weight]** are to be interpreted as meaning the weight of a gram [a pound] at a place where g has the standard value, 980.665 cm/sec.^{2}

Wien's displacement constant.—(w). *See* Black body.

Year.—(yr). Time required for earth to make one complete circuit of its orbit, as defined by its return to the same position as determined by the sun and some celestial point of reference. For the **tropical, equinoctial, or ordinary** year the reference point is the mean vernal equinox; for the **sidereal, or true,** year, it is a fixed star; for **anomalistic** year, it is perihelion of earth's orbit; for **eclipse** year, it is ascending node of moon's orbit.

Young's modulus.—If a bar of uniform section be subjected to a longitudinal tension, the ratio of this stress to the resulting elongation per unit of length is called its Young's modulus. Also called **modulus of elasticity, elastic modulus, longitudinal elasticity, coefficient of resistance to extension, modulus of traction.**

ELEMENTS AND ATOMS

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ATOMIC WEIGHTS

The values given in column four were compiled for International Critical Tables (I. C. T.) by Prof. G. P. Baxter in 1923 and are those upon which all the data given in International Critical Tables are based.

Following these are shown the accepted atomic weights back to 1882. For the period since 1903 these are taken from the reports of the International Committee on Atomic Weights; for the period 1894 to 1903, from the reports of the American Chemical Society's Committee on Atomic Weights; for the year 1882, from F. W. Clarke's "A Recalculation of the Atomic Weights," reproduced in the first (1883) edition of "Landolt-Bornstein." These 1882 values (to two decimals) are given in parentheses. A date in parentheses indicates the first appearance of the element in the atomic weight table. All the values given are based upon O - 16.000

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925–1882)
A	18	Argon	39 91	'25, 39.91, '24-'19, 39 9; '18 '11, 39.88; '10-'03, 39.9; '02, 39.96 (1902)
Ac	89	Actinium	?	
Ag	47	Silver	107 880	'25, 107.880; '24–'09, 107.88; '08–'03, 107.93; '02–'94, 107.92 (107.92)
Al	13	Aluminium	26 96	'25, 26.97; '24 '22, 27 0; '21–'00, 27.1; '99–'96, 27.11; '95–'94, 27 (27.08)
As	33	Arsenic	74 96	'25–'10, 74.96; '09–'00, 75 0; '99–'97, 75.01; '96, 75.09; '95–'94, 75 0 (75.09)
Au	79	Gold	197 2	'25–'00, 197.2; '99 '97, 197.23; '96, 197.24; '95 '94, 197 3 (196.61)
B	5	Boron	10 82	'25, 10 82; '24–'19, 10 9; '18–'00, 11 0; '99 '96, 10.95; '95-'94, 11 (10.97)
Ba	56	Barium	137 37	'25–'09, 137 37; '08 '00, 137.40; '99–'94, 137.43 (137.01)
Be	4	Beryllium	9 02	'25, 9.02; '24–'00, 9.1; '99–'96, 9.08; '95–'94, 9 (9.11)
Bi	83	Bismuth	209 00	'25–'22, 209.0; '21–'07. 208.0; '06–'03, 208.5; '02–'00, 208.1; '99–'96, 208.11; '95, 208; '94, 208.9 (208.00)
Br	35	Bromine	79 916	'25, 79.916; '24–'09, 79.92; '08–'03, 79.96; '02–'94, 79.95 (79.95)
C	6	Carbon	12.000	'25, 12.000; '24–'16, 12.005; '15–'98, 12 00; '97–'96, 12.01; '95–'94, 12 (12.00)
Ca	20	Calcium	40 07	'25 '12, 40.07; '11–'09, 40.09; '08 '00, 40.1; '99–'97, 40.07; '96, 40.08; '95 '94, 40 (40.08)
Cb	41	Columbium	93 1	'25 '17, 93.1; '16-'09, 93.5; '08–'03, 94; '02–'00, 93.7; '99–'97, 93.73; '96 '94, 94.0 (94.03)
Cd	48	Cadmium	112 41	'25, 112.41; '24–'09, 112.40; '08–'00, 112.4; '99, 112.38; '98–'97, 111.95; '96, 111.93; '95-'94, 112 (112.09)
Ce	58	Cerium	140 25	'25-'04, 140.25; '03, 140; '02-'00, 139; '99–'98, 139.35; '97–'94, 140.25 (140.75)
Cl	17	Chlorine	35 458	'25, 35.457; '24–'09, 35.46; '08–'94, 35.45 (35.45)
Co	27	Cobalt	58 97	'25, 58.94; '24–'09, 58.97; '08–'00, 59.0; '99–'98, 58.99; '97, 58.93; '96, 58.95; '95, 59.5; '94, 59 (59 02)
Cp	71	Cassiopeium	175 0	*See* Lu
Cr	24	Chromium	52 01	'25, 52.01; '24–'10, 52.0; '09–'00, 52.1; '99–'96, 52.14; '95–'94, 52.1 (52.13)
Cs	55	Cesium	132 81	'25-'09, 132.81; '08–'04, 132.9; '03, 133.0; '02–'00, 132.9; '00-'96, 132.89; '95–'94, 132.9 (132.92)
Ct	72	Celtium		Same as Hf
Cu	29	Copper	63 57	'25 '09, 63.57; '08–'94, 63.6 (63.32)
Ds Dy	66	Dysprosium	162 52	'25, 162.52; '24–'08, 162.5 (1908)
Em	86	Ra-emanation	222	*See* Rn
Er	68	Erbium	167 7	'25–'12, 167.7; '11–'09, 167.4; '08–'00, 166.0; '99 '97, 166.32; '96–'94, 166.3 (166.27)
Eu	63	Europium	152 0	'25–'07, 152.0 (1907)
F	9	Fluorine	19 00	'25–'03, 19.0; '02–'00, 19.05; '99–'97, 19.06; '96, 19.03; '95–'94, 19 (19.03)
Fe	26	Iron	55 84	'25–'12, 55.84; '11–'09, 55.85; '08–'01, 55.9; '00, 56.0; '99–'96, 56.02; '95–'94, 56 (56.04)
Ga	31	Gallium	69 72	'25, 69.72; '24–'19, 70.1; '18–'09, 69.9; '08–'00, 70.0; '99–'97, 69.91; '96–'94, 69.0 (68.96)
Gd	64	Gadolinium	157 26	'25, 157.26; '24–'09, 157.3; '08–'03, 156; '02, 156.4; '01–'00, 157.0; '99–'97, 156.76; '96–'94, 156.1

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925–1882)
Ge	32	Germanium	72.38	'25, 72.60; '24–'00, 72.5; '99–'97, 72.48; '96–'94, 72.3
Gl	4	Glucinium	9.02	*See* Be
H	1	Hydrogen	1.0077	'25, 1.0077; '24–'94, 1.008 (1.00)
He	2	Helium	4.00	'25–'16, 4.00; '15–'11, 3.99; '10–'03, 4.0; '02, 3.96 (1902)
Hf	72	Hafnium	178.6	
Hg	80	Mercury	200.61	'25, 200.61; '23–'12, 200.6; '11–'94, 200.0 (200.17)
Ho	67	Holmium	163.4	'25, 163.4; '23–'13, 163.5 (1913)
I (J)	53	Iodine	126.932	'25, 126.932; '24–'09, 126.92; '08–'05, 126.97; '04–'94, 126.85 (126.85)
In	49	Indium	114.8	'25–'09, 114.8; '08–'05, 115; '04–'00, 114; '99–'97, 113.85; '96–'91, 113.7 (113.66)
Ir	77	Iridium	193.1	'25–'09, 193.1; '08–'03, 193.0; '02–'00, 193.1; '99–'96, 193.12; '95–'94, 193.1 (193.09)
K	19	Potassium	39.095	'25, 39.096; '24–'09, 39.10; '08–'03, 39.15; '02–'94, 39.11 (39.11)
Kr	36	Krypton	82.9	'25, 82.9; '24–'11, 82.92; '10, 83.0; '09–'03, 81.8; '02, 81.76 (1902)
La	57	Lanthanum	138.91	'25, 138.90; '24–'09, 139.0; '08–'03, 138.9; '02–'00, 138.6; '99–'97, 138.64; '96, 138.6; '95–'94, 138.2 (138.84)
Li	3	Lithium	6.939	'25, 6.940; '24–'11, 6.94; '10–'09, 7.00; '08–'96, 7.03; '95–'94, 7.02 (7.02)
Lu	71	Lutecium	175.0	'25–'16, 175.0; '15–'09, 174.0 (1909)
Ma	43	Masurium		
Mg	12	Magnesium	24.32	'25–'09, 24.32; '08–'03, 24.36; '02–'00, 24.3; '99–'97, 24.28; '96, 24.29; '95–'94, 24.3 (24.01)
Mn	25	Manganese	54.93	'25–'09, 54.93; '08–'00, 55.0; '99–'96, 54.99; '95–'94, 55 (54.03)
Mo	42	Molybdenum	96.0	'25–'00, 96.0; '99–'97, 95.99; '96, 95.98; '95–'94, 96 (95.75)
N	7	Nitrogen	14.008	'25–'19, 14.008; '18–'07, 14.01; '06–'96, 14.04; '95, 14.05; '94, 14.03 (14.03)
Na	11	Sodium	22.997	'25, 22.997; '24–'09, 23.00; '08–'94, 23.05 (23.05)
Nb	41	Niobium	93.1	*See* Cb
Nd	60	Neodymium	144.27	'25, 144.27; '24–'0 144.3; '08–'99, 143. '98–'97, 140.80; '96–'9 140.5
Ne	10	Neon	20.2	'25–'09, 20.2; '10–'0 20.0 (1904)
Ni	28	Nickel	58.69	'25, 58.69; '24–'09, 58.6 '08–'00, 58.7; '99–'9 58.69; '95–'94, 58. (58.06)
Nt	86	Niton	222.	*See* Rn
O	8	Oxygen	16.000	'25–'94, 16.000 (16.00)
Os	76	Osmium	190.8	'25, 190.8; '23–'09, 190. '08–'00, 191.0; '99–'9 190.99; '95–'94, 190. (198.95?)
P	15	Phosphorus	31.024	'25, 31.027; '24–'11 31.04; '10–'00, 31. '99–'94, 31.02; '95–'94 31 (31.03)
Pa	91	Protoactinium	?	
Pb	82	Lead	207.20	'25–'16, 207.20; '15–'0 207.10; '08–'03, 206. '02–'96, 206.92; '95–'94 206.95 (206.95)
Pd	46	Palladium	106.7	'25–'09, 106.7; '08–'03 106.5; '02–'00, 107.0 '99–'96, 106.36; '95 106.5; '94, 106.6 (105.98
Po	84	Polonium	(210)	
Pr	59	Praseodymium	140.92	'25, 140.92; '24–'16 140.9; '15–'09, 140.6 '08–'00, 140.5; '99–'97 143.60; '96–'94, 143.5
Pt	78	Platinum	195.23	'25, 195.23; '24–'11 195.2; '10–'09, 195.0 '08–'03, 194.8; '02–'00 194.9; '99–'96, 194.80 '95–'94, 195 (194.87)
Ra	88	Radium	225.95	'25, 225.95; '24–'16, 226 '15–'09, 226.4; '08–'03 225 (1903)
Rb	37	Rubidium	85.44	'25, 85.44; '24–'09, 85.45; '08–'05, 85.5; '04–'00, 85.4; '99–'96, 85.43; '95–'94, 85.5 (85.53)
Re	75	Rhenium		
Rh	45	Rhodium	102.91	'25, 102.91; '24–'09, 102.9; '08–'00, 103.0; '99–'96, 103.01; '95–'94, 103 (104.29)
Rn	86	Radon	222	'25, 222; '24–'12, 222.4 (1912)
Ru	44	Ruthenium	101.7	'25–'00, 101.7; '99–'96, 101.68; '95–'94, 101.6 (104.46?)
S	16	Sulfur	32.065	'25, 32.065; '24–'16, 32.06; '15–'09, 32.07; '08–'03, 32.06; '02–'96, 32.07; '95–'94, 32.06 (32.06)
Sa	62	Samarium	150.43	'25, 150.43; '24–'09, 150.4; '08–'05, 150.3;

Symbol	Atomic number	Name	I. C. T. at. wt.	Atomic weights (1925–1882)
Sa	62	Samarium	150.43	'04–'03, 150; '02–'00, 150.3; '99–'97, 150.26; '96–'94, 150.0
Sb	51	Antimony	121.77	'25, 121.77; '24–'03, 120.2; '02–'00, 120.4; '99–'96, 120.43; '95–'94, 120 (120.23)
Sc	21	Scandium	45 10	'25–'21, 45.10; '20–'00, 44.1; '99–'97, 44.12; '96–'94, 44.0 (44.08)
Se	34	Selenium	79 2	'25–'00, 79.2; '99, 79.17; '98–'97, 79.02; '96–'94, 79.0 (78.98)
Si	14	Silicon	28 06	'25, 28.06; '24–'22, 28 1; '21–'09, 28.3; '08–'94, 28.4 (28.26)
Sm	62	Samarium	150 43	*See* Sa
Sn	50	Tin	118 70	'25–'16, 118.70; '15–'00, 119.0; '99–'96, 119.05; '95–'94, 119 (117.97)
Sr	38	Strontium	87 62	'25–'11, 87.63; '10–'09, 87.62; '08–'00, 87.6; '99–'96, 87.61; '95, 87.66; '94, 87.6 (87.58)
Ta	73	Tantalum	181.5	'25–'10, 181.5; '11–'07, 181.0; '06–03, 183; '02–'00, 182.8; '99–'97, 182.84; '96–'94, 182.6 (182 56)
Tb	65	Terbium	159 2	'25–'07, 159.2; '06–'94, 160
Te	52	Tellurium	127 5	'25–'09, 127.5; '08–'03, 127.6; '02, 127.7; '01–'00, 127.5; '99–'97, 127.49; '96, 127; '95–'94, 125 (128.252)
Th	90	Thorium	232 15	'25–'19, 232.15; '18–'11, 232.4; '10–'09, 232.42; '08–'03, 232.5; '02–'00, 232.6; '99–'96, 232.63; '95–'94, 232.6 (233.95)
Ti	22	Titanium	47.9	'25–'03, 48.1; '02–'96, 48.15; '95–'94, 48 (49.96?)
Tl	81	Thallium	204.4	'25, 204.39; '24–'09, 204.0; '08–'03, 204.1; '02–'96, 204.15; '95–'94, 204.18 (204.18)
m u	69	Thulium	169.4	'25, 169.4; '24–'22, 169.9; '21–'09, 168.5; '08–'03, 171; '02–'94, 170.7
U	92	Uranium	238.17	'25, 238.17; '24–'16, 238.2; '15–'03, 238.5; '02–'00, 239.6; '99–'96, 239.59; '95–'94, 239.6 (239.03)
X$_2$	91	Uranium-X$_2$	(234)	Isotope of Pa
	23	Vanadium	50.96	'25, 50.96; '24–'12, 51.0; '11, 51.06; '10–'03, 51.2; '02–'00, 51.4; '99–'96, 51.38; '95–'94, 51.4 (51.37)
W	74	Tungsten	184 0	'25–'00, 184.0; '99–'97, 184.83; '96, 184.84; '95, 184.9; '94, 184 (184.03)
Xe	54	Xenon	130 2	'25–'11, 130.2; '10, 130.7; '09–'02, 128 (1902)
Y Yt	39	Yttrium	89.0	'25, 88.9; '24–'19, 89.33; '18–'16, 88.7; '15–'00, 89.0; '99–'97, 89.02; '96, 88.95; '95–'94, 89.1 (90.02?)
Yb	70	Ytterbium	173 6	'25, 173.6; '24–'16, 173.5; '15–'09, 172.0; '08–'03, 173; '02–'00, 173.2; '99–'97, 173.19; '96–'94, 173.0 (173.16)
Zn	30	Zinc	65 38	'25, 65.38; '24–'10, 65.37; '09, 65.7; '08–'00, 65.4; '99–'96, 65.41; '95–'94, 65.3 (65.05)
Zr	40	Zirconium	91	'25, 91; '24–'09, 90.6; '01–'97, 90.4; '96–'94, 90.6 (89 57)

TABLE OF ISOTOPES

F. W. Aston

Element	Atomic number	I. C. T. atomic weight	Minimum number of isotopes	Mass numbers in order of the intensities of the mass-spectrum lines	Lit.
A	18	39.91	2	40, 36	(3, 5, 21)
Ag	47	107.880	2	107, 109	(15, 26)
Al	13	26.96	1	27	(10)
As	33	74.96	1	75	(4, 22)
B	5	10.82	2	11, 10	(4, 22)
Ba	56	137.37	1	138, 136	(17, 18)
Be	4	9 02	1	9	(33)
Bi	83	209.00	1	209	(19)
Br	35	79 916	2	79, 81	(4, 22)
C	6	12.000	1	12	(2, 21)
Ca	20	40.07	2	40, 44	(31, 32)
Cd	48	112.41	6	110, 111, 112, 113, 114, 116	(19)
Ce	58	140 25	2	140, 142	(18)
Cl	17	35 458	2	35, 37	(2, 21, 23)
Co	27	58 97	1	59	(15, 26)
Cr	24	52 01	1	52	(15, 26)
Cs	55	132 81	1	133	(6, 24)
Cu	29	63.57	2	63, 65	(14, 26)
F	9	19.00	1	19	(4, 22)
Fe	26	55.84	2	56, 54	(9, 17)
Ga	31	69.72	2	69, 71	(15, 26)
Ge	32	72 38	3	74, 72, 70	(13, 26)
Gl	4	9.02	1	9	(33)
H	1	1.0077	1	1	(3, 21)
He	2	4.00	1	4	(3, 21)
Hg	80	200.61	2,6	197–200, 202, 204	(2, 3, 21)
I	53	126.932	1	127	(5, 23)
In	49	114.8	1	115	(16)
K	19	39.095	2	39, 41	(6, 24)
Kr	36	82.9	6	84, 86, 82, 83, 80, 78	(3, 21)
La	57	138.91	1	139	(17)

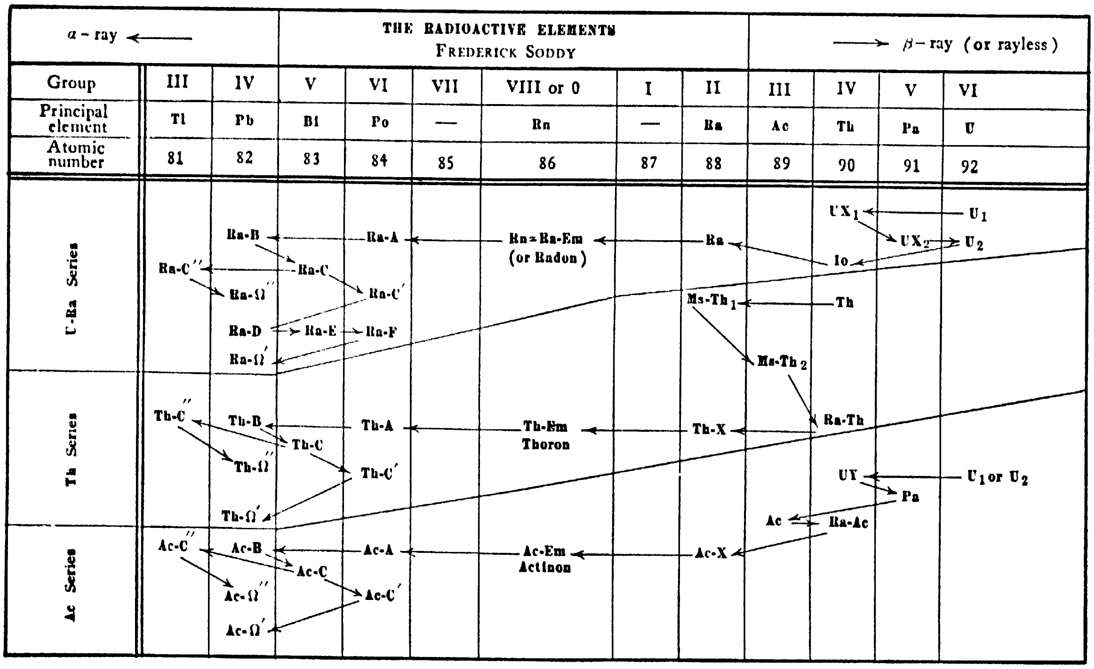
Continued on p. 47.

PERIODIC CHART OF THE ELEMENTS WITH ATOMIC NUMBERS AND ATOMIC WEIGHTS

I	II	III	IV	V	VI	VII	VIII or 0			
1 H 1.0077							2 He 4.00			
3 Li 6.939	4 Be 9.02	5 B 10.82	6 C 12.00	7 N 14.008	8 O 16.000	9 F 19.00	10 Ne 20.2			
11 Na 22.997	12 Mg 24.32	13 Al 26.96	14 Si 28.06	15 P 31.024	16 S 32.065	17 Cl 35.458	18 A 39.91			
19 K 39.095	20 Ca 40.07	21 Sc 45.10	22 Ti 47.9	23 V 50.96	24 Cr 52.01	25 Mn 54.93		26 Fe 55.84	27 Co 58.97	28 58.69
29 Cu 63.57	30 Zn 65.38	31 Ga 69.72	32 Ge 72.38	33 As 74.96	34 Se 79.2	35 Br 79.916	36 Kr 82.9			
37 Rb 85.44	38 Sr 87.62	39 Yt 89.0	40 Zr 91	41 Cb 93.1	42 Mo 96.0	43 Ma		44 Ru 101.7	45 Rh 102.91	46 106.7
47 Ag 107.880	48 Cd 112.41	49 In 114.8	50 Sn 118.70	51 Sb 121.77	52 Te 127.5	53 I 126.932	54 Xe 130.2			
55 Cs 132.81	56 Ba 137.37	★ 57 La 138.91	72 Hf (178.6)	73 Ta 181.5	74 W 184.0	75 Re		76 Os 190.8	77 Ir 193.1	78 195.23
79 Au 197.2	80 Hg 200.61	81 Tl 204.4	82 Pb 207.20	83 Bi 209.00	84 Po (210)	85	86 Rn 222			
87	88 Ra 225.95	89 Ac	90 Th 232.15	91 Pa	92 U 238.17					

★	57 La 138.91	58 Ce 140.25	59 140.92
60 Nd 144.27	61	62 Sa 150.43	Eu 152.0
64 Gd 157.26	65 Tb 159.2	66 Dy 162.52	67 163.4
68 Er 167.7	69 Tu 169.4	70 Yb 173.6	71 Lu 175.0

★ Indicates rare earths See above



THE RADIOACTIVE ELEMENTS
FREDERICK SODDY

α – ray ←

→ β – ray (or rayless)

Group	III	IV	V	VI	VII	VIII or 0	I	II	III	IV	V	VI
Principal element	Tl	Pb	Bi	Po	—	Rn	—	Ra	Ac	Th	Pa	U
Atomic number	81	82	83	84	85	86	87	88	89	90	91	92

U-Ra Series
UX$_1$
U$_1$
UX$_2$
U$_2$
Io
Ra
Rn = Ra-Em (or Radon)
Ra-A
Ra-B
Ra-C
Ra-C''
Ra-C'
Ra-Ω''
Ra-D
Ra-E
Ra-F
Ra-Ω'
Th
Ms-Th$_1$
Ms-Th$_2$
Th Series
Ra-Th
Th-X
Th-Em Thoron
Th-A
Th-B
Th-C
Th-C''
Th-C'
Th-Ω''
Th-Ω'
UY
U$_1$ or U$_2$
Pa
Ac
Ra-Ac
Ac Series
Ac-X
Ac-Em Actinon
Ac-A
Ac-B
Ac-C
Ac-C''
Ac-C'
Ac-Ω''
Ac-Ω'

TABLE OF ISOTOPES.—*Continued*

Element	Atomic number	I. C. T. atomic weight	Minimum number of isotopes	Mass numbers in order of the intensities of the mass-spectrum lines	Lit
Li	3	6.939	2	7, 6	(**24, 27, 29, 30**)
Mg	12	24 32	3	24, 25, 26	(**28, 30**)
Mn	25	54.93	1	55	(**15, 26**)
N	7	14 008	1	14	(**3, 21**)
Na	11	22 997	1	23	(**6, 24**)
Nd	60	144 27	3	142, 144, 146, 145	(**17, 18**)
Ne	10	20 2	2	20, 22	(**1, 20, 21**)
Ni	28	58 69	2	58, 60	(**7**)
O	8	16 000	1	16	(**2, 21**)
P	15	31 024	1	31	(**4, 22**)
Pr	59	140 92	1	141	(**17**)
Rb	37	85 44	2	85, 87	(**6, 24**)
S	16	32 065	1	32	(**4, 22**)
Sb	51	121 77	2	121, 123	(**11, 25**)
Sc	21	45 10	1	45	(**15, 26**)
Se	34	79 2	6	80, 78, 76, 82, 77, 74	(**10**)
Si	14	28 06	3	28, 29, 30	(**4, 18, 22**)
Sn	50	118 70	7,8	120, 118, 116, 124, 119, 117, 122, 121	(**8**)
Sr	38	87.62	2	88, 86	(**15, 17, 26**)
Te	52	127 5	3	128, 130, 126	(**19**)
Ti	22	47 9	1	48	(**15, 26**)
V	23	50 96	1	51	(**15, 26**)
Xe	54	130 2	7,9	129, 132, 131, 134, 136, 128, 130, 126, 124	(**3, 5, 10, 21, 23**)
Yt	39	89 0	1	89	(**15, 26**)
Zn	30	65.38	4	64, 66, 68, 70	(**31**)
Zr	40	91	3	90, 94, 92	(**18**)

LITERATURE

(For a key to the periodicals see end of volume)

(1) Aston, *68*, **104**: 334, 19 (2) *Ibid*, **104**: 393, 19. (3) *Ibid*, **105**: 8; 20 (4) *Ibid*, **105**: 547; 20. (5) *Ibid*, **106**: 468, 20. (6) *Ibid.*, **107**: 72, 21 (7) *Ibid*, **107**: 520; 21. (8) *Ibid*, **109**: 813; 22. (9) *Ibid*, **110**: 312, 22.
(10) Aston, *68*, **110**: 664; 22. (11) *Ibid*, **110**: 732; 22. (12) *Ibid*, **111**: 739, 23 (13) *Ibid*, **111**: 771, 23. (14) *Ibid*, **112**: 162; 23. (15) *Ibid*, **112**: 419, 23 (16) *Ibid.*, **113**: 192; 24. (17) *Ibid*, **113**: 856; 24. (18) *Ibid.*, **114**: 273, 24 (19) *Ibid*, **114**: 717, 24.
(20) Aston, *3*, **39**: 449, 20. (21) *Ibid.*, **39**: 611; 20. (22) *Ibid*, **40**: 628, 20 (23) *Ibid*, **42**: 140; 21. (24) *Ibid*, **42**: 436; 21. (25) *Ibid*, **45**: 924, 23 (26) *Ibid.*, **47**: 385; 24. (27) Aston and Thomson, *68*, **106**: 827; 21 (28) Dempster, *166*, **52**: 559, 20 (29) Dempster, *166*, **53**: 363, 21
(30) Dempster, *2*, **18**: 415, 21 (31) *Ibid*, **19**: 431, 22. (32) *Ibid.*, **20**: 631, 22. (33) Thomson, *3*, **42**: 837, 21.

THE STRUCTURE OF THE ISOLATED ATOM

(Symbols, p. 50)

H. A. Kramers

According to the fundamental postulates of Bohr's atomic ory, a series of discrete "stationary states" has to be correlated h each atom. A definite "energy-content" can be assigned to very state, and an atom in a given state can change its energy only y performing a process of "transition" to another state. The nission of a spectral line of frequency ν is correlated with a ontaneous transition from a stationary state of energy content $_1$ to another of energy content E_2 by equation (1)

$$\nu = \frac{1}{\mathbf{h}}(E_1 - E_2) \tag{1}$$

The stationary state with the smallest energy is termed the "normal state" of the atom. The properties of the stationary states can, to a considerable extent, be accounted for by assuming that the electrons surrounding the nucleus have definite motions, characterized by integral values of certain quantities. These integers are called the "quantum numbers" of the stationary state in question; by their values the energy of the state is completely fixed. For general treatment of the subject, see (**1, 3, 4, 10, 11, 18**).

Of special interest are the recent attempts (**21**) to develop a rational "quantum mechanics" of the atom. This work clearly demonstrates the limited applicability of a picture of atomic structure, in which the behavior of the electrons inside the atom is visualized by orbits possessing definite kinematical properties.

Atoms Containing One Electron.—Only for atoms containing a single electron, can a fairly complete description of the electronic motion in the stationary state, and of the significance of the quantum numbers be given. The motion of the electron obeys quite approximately the laws of electrodynamics, and can be described as a Keplerian elliptic motion, with the centre of gravity of the nucleus and the electron in one focus. On this motion, a slow uniform precession in the plane of motion is superposed (effect of variability of mass or "relativity-effect"). Two quantum numbers (n, k) define the stationary states (n, k = 1, 2, 3 ; $k \leq n$), k/n being the ratio of the minor to the major axis of the ellipse. The states are denoted by the symbol n_k.

In the **normal state,** $1_1(n = k = 1)$, the orbit is circular; and, omitting the correction due to the relativity effect, its constants are given by equations (2)

$$\begin{aligned}
a_1 &= \frac{1}{Z}\cdot\frac{\mathbf{h}^2}{4\pi^2\mathbf{e}^2\mathbf{m}_0} = \frac{r_1}{Z} = \frac{0.53}{Z} \times 10^{-8}\ \text{cm} \\
\omega_1 &= \frac{Z^2}{1+\frac{\mathbf{m}_0}{M}} \times \frac{4\pi^2\mathbf{e}^4\mathbf{m}_0}{\mathbf{h}^3} = \frac{2\nu_\infty Z^2}{1+\frac{\mathbf{m}_0}{M}} = \frac{6.6Z^2}{1+\frac{\mathbf{m}_0}{M}} \times 10^{15}\ \text{sec}^{-1} \\
W_1 &= \frac{Z^2}{1+\frac{\mathbf{m}_0}{M}} \times \frac{2\pi^2\mathbf{e}^4\mathbf{m}_0}{\mathbf{h}^2} = \frac{Z^2\nu_\infty\mathbf{h}}{1+\frac{\mathbf{m}_0}{M}} = \frac{2.15Z^2}{1+\frac{\mathbf{m}_0}{M}} \times 10^{-11}\ \text{erg.}
\end{aligned} \tag{2}$$

In **higher quantum states,** the orbital constants are, with the same approximation, given by (3, 4):

$$\begin{aligned}
a_n &= n^2a_1 = \frac{n^2}{Z}r_1 \\
\omega_n &= \frac{\omega_1}{n^3} = \frac{2Z^2\nu_\infty}{n^3\left(1+\frac{\mathbf{m}_0}{M}\right)} \\
W_n &= \frac{W_1}{n^2} = \frac{Z^2\nu_\infty\mathbf{h}}{n^2\left(1+\frac{\mathbf{m}_0}{M}\right)}
\end{aligned} \tag{3}$$

$$b_{n,k} = nka_1 = \frac{nkr_1}{Z};\ p_k = k^2a_1 = \frac{k^2r_1}{Z} \tag{4}$$

The number of revolutions corresponding to one rotation of the major axis, is, to a first approximation, given by (5):

$$\frac{\omega_n}{\sigma_{n,k}} = \frac{k^2}{Z^2} \times \frac{2}{\alpha^2} = \frac{k^2}{Z^2} \times 37{,}700 \tag{5}$$

$$\left(\alpha = \frac{2\pi\mathbf{e}^2}{\mathbf{hc}} = 7.30 \times 10^{-3} \cong \frac{1}{137};\ \alpha^2 = 5.31 \times 10^{-5}\right)$$

The exact energy formula, neglecting terms containing $\mathbf{m}_0/M$, is given by (6):

$$\begin{aligned}
W_{n,k} &= \mathbf{m}_0\mathbf{c}^2\left[\left\{1 + \left(\frac{\alpha Z}{n - k + \sqrt{k^2 - \alpha^2Z^2}}\right)^2\right\}^{-\frac{1}{2}} - 1\right] \\
&= \frac{Z^2}{n^2} \times \frac{2\pi^2\mathbf{e}^4\mathbf{m}_0}{\mathbf{h}^2}\left\{1 + \alpha^2Z^2\left(\frac{1}{kn} - \frac{3}{4n^2}\right) + \ .\ .\ .\ \right\}
\end{aligned} \tag{6}$$

(For general formula for W, including terms in $\mathbf{m}_0/M$, see (**9**).) Figure 1 illustrates the stationary states in the hydrogen atom for which n = 1, 2, 3, 4. The arrows indicate the transitions giving *rise to the fine-structure components of the spectral lines, H_α and H_β. The numerical constants for these states are given in Table 1.*

TABLE 1.—HYDROGEN ORBITS; $r_1 = 5.286 \times 10^{-9}$ cm (11)

n_k	a/r_1	b/r_1	p/r_1	$\omega \times 10^{-14}$	$\sigma \times 10^{-8}$	ω/σ
1_1	1	1	1	65 78	1746	37 700
2_1	4	2	1	8 222	218 3	37 700
2_2	4	4	4	8 222	54 57	150 700
3_1	9	3	1	2 436	64 68	37 700
3_2	9	6	4	2 436	16 17	150 700
3_3	9	9	9	2 436	7.187	339 300
4_1	16	4	1	1 029	27 29	37 700
4_2	16	8	4	1 029	6 822	150 800
4_3	16	12	9	1 029	3 032	339 300
4_4	16	16	16	1.029	1.705	603 200

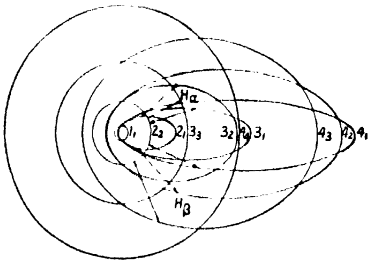


FIG 1—Orbits in hydrogen to $n = 4$. (*Reproduced by permission from The Journal of the Franklin Institute.*)

Atoms Containing More than One Electron.—A complete theory of stationary states is lacking. Many properties of these states can be accounted for, however, on the basis of the principles applied to atoms containing one electron. As a first approximation, each electron may be considered as moving in a central field of force due to the nucleus and the other electrons, its motion being characterized by a "principal quantum number" n and a "subordinate quantum number" k. The electronic orbit can be described as a plane periodic orbit on which a uniform precession in the plane is superposed ("central orbit" *cf.* Fig. 2).

If the position of the electron in the orbital plane is defined by polar coordinate (r, φ), the quantum numbers are defined by Sommerfeld's quantum conditions (7)

$$k = \frac{2\pi \mathbf{m}_0 \beta r^2}{\mathbf{h}} \frac{d\phi}{dt} = \frac{2\pi P}{\mathbf{h}} \qquad (n - k) = \frac{1}{\mathbf{h}} \oint \mathbf{m}_0 \beta \left(\frac{dr}{dt}\right)^2 dt \quad (7)$$

where the factor β becomes equal to 1 if the relativity effect is neglected. P is equal to the angular momentum of the electron with respect to the nucleus; the integral has to be taken over a complete period of the radial motion, from A to B (Fig. 2).

In the **normal state** the electrons are distributed in groups, each of which is characterized by its quantum numbers (n, k). On passing from the nucleus to the surface of the atom, the successive groups correspond to successive integral values of the main quantum number n ("n-quantum group"), the innermost group being characterized by $n = 1$; each group is divided into sub-groups corresponding to the different values which k may take. The possibility of reconciling such a picture with the dynamical properties of quantized central orbits is closely connected with the fact that in an orbit for which $k < n$ the electron will, in each revolution, dive into and leave again all regions occupied by *electronic orbits for which the principal quantum number is smaller than n but equal to or greater than k (conception of "penetrating orbits").*

The maximum number of electrons which an n-quantum group can contain is equal to $2n^2$. If it contains this number, it contains sub-groups corresponding to all possible values for k ($k = 1, 2 \ldots n$), and it is said to be a **"finally completed"** group. If a group, due to the dynamical properties of the atom under consideration, contains only sub-groups corresponding to $k = 1, 2 \ldots k_0$ $(k_0 < n)$ it will be in a state which is termed **"provisionally completed,"** if it contains $2k_0^2$ electrons. For example, the 4-quantum group has reached the state of a 2-group ($k_0 = 1$) in Ca (20), the state of an 8-group or 8-shell ($k_0 = 2$) in Kr (36), the state of an 18-group or 18-shell ($k_0 = 3$) in Ag (47), and its final state of a completed 32-group or 32-shell ($k_0 = 4$) in Lu (71). With the exception of the 2-groups it seems impossible to assign definite values to the number of electrons in the several sub-groups of a provisionally, or finally, completed group; in fact, the actual properties of the electronic groups seem to show that the simple conception of central orbits characterized by the symbol n_k is essentially insufficient for their description. (Originally Bohr assumed that a group of $2k_0^2$ electrons contained $2k_0$ electrons in each sub-group.) Closely connected herewith is the impossibility of assigning definite spatial arrangements to the orbits belonging to one and the same group. In Table 2 the number of electrons in each group is given as far as the theory allows of a definite statement; those in parentheses are uncertain.

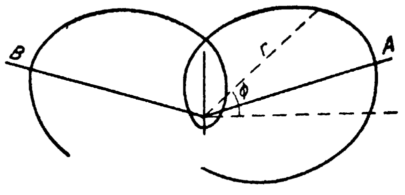


FIG. 2.—Central orbit.

From calculations based on Sommerfeld's quantum conditions and certain simplifying assumptions, a rough estimate of the dimensions of the different types of orbits may be made. Such estimates for neutral atoms and for positive ions containing only finally, or provisionally, completed groups are schematically represented in Fig. 3. The small vertical lines are so drawn that their distances from the dot at the left are proportional to the radius of the sphere inside which the electrons belonging to the respective groups are moving. The symbols $g\ (n_{1,2} \ldots {}_{k_0})$ means that the corresponding groups contain g electronic orbits of principal quantum number n, and of subordinate quantum numbers from 1 to k_0.

For the calculation of the dimensions of the outermost groups it has been necessary to consider also experimental data relative to the effective gas-kinetic radii of the atoms of the inert gases, the effective radii of ions in crystals, ionic refraction, etc. As a rule the effective radii are 1.5 to 2.5 times larger than the orbital dimensions. As regards the inner groups, the estimate is rather accurate; for the outer groups, errors of the order of 10% might be expected. Special mention must be made of the uncertainty in the radius of the 5-quantum group for elements heavier than barium; the radii of this group as given in Fig. 3 for the elements (72), 79, 80, 81, 82 are perhaps some 10% too high, as compared with radii of the homologous elements 47, 48, 49, 50.

For atoms containing only one electron in the outermost group, the dimensions of the orbit of this electron, and its frequency of revolution can with considerable accuracy be derived from the

TABLE 2

	1_1	$2_1\ 2_2$	$3_1\ 3_2\ 3_3$	$4_1\ 4_2\ 4_3\ 4_4$	$5_1\ 5_2\ 5_3\ 5_4\ 5_5$	$6_1\ 6_2\ 6_3\ 6_4\ 6_5\ 6_6$	$7_1\ 7_2$
1 H	1						
2 He	2						
3 Li	2	1					
4 Be	2	2					
5 B	2	2 1					
6 C	2	2 (2)					
— —	—	— —					
10 Ne	2	8					
11 Na	2	8	1				
12 Mg	2	8	2				
13 Al	2	8	2 1				
14 Si	2	8	2 (2)				
— —	—	— —	— —				
18 A	2	8	8				
19 K	2	8	8	1			
20 Ca	2	8	8	2			
21 Sc	2	8	8 1	(2)			
22 Ti	2	8	8 2	(2)			
— —	—	— —	— — —	—			
29 Cu	2	8	18	1			
30 Zn	2	8	18	2			
31 Ga	2	8	18	2 1			
— —	—	— —	— — —	— —			
36 Kr	2	8	18	8			
37 Rb	2	8	18	8	1		
38 Sr	2	8	18	8	2		
39 Y	2	8	18	8 1	(2)		
40 Zr	2	8	18	8 2	(2)		
— —	—	— —	— — —	— — —	—		
47 Ag	2	8	18	18	1		
48 Cd	2	8	18	18	2		
49 In	2	8	18	18	2 1		
— —	—	— —	— — —	— — —	— —		
54 X	8	8	18	18	8		
55 Cs	2	8	18	18	8	1	
56 Ba	2	8	18	18	8	2	
57 La	2	8	18	18	8 1	(2)	
58 Ce	2	8	18	18 1	8 1	(2)	
59 Pr	2	8	18	18 2	8 1	(2)	
— —	—	— —	— — —	— — — —	— — —	—	
71 Lu	2	8	18	32	8 1	(2)	
72 Hf	2	8	18	32	8 2	(2)	
— —	—	— —	— — —	— — — —	— — —	—	
79 Au	2	8	18	32	18	1	
80 Hg	2	8	18	32	18	2	
81 Tl	2	8	18	32	18	2 1	
— —	—	— —	— — —	— — — —	— — —	— —	
86 Rn	2	8	18	32	18	8	
87 —	2	8	18	32	18	8	1
88 Ra	2	8	18	32	18	8	2
89 Ac	2	8	18	32	18	8 1	(2)
90 Th	2	8	18	32	18	8 2	(2)
— —	—	— —	— — —	— — — —	— — —	— — —	—
— —	—	— —	— — —	— — — —	— — — —	— — —	—
118 —	2	8	18	32	32	18	8]

frequency of the lowest frequency term in the corresponding spectral series, provided we may adhere to the simple central orbit model. Figure 4 contains a schematic picture of the orbits of the outer electron in the normal state of neutral atoms of the alkali metals, and of Cu, Ag, Au. They are all penetrating orbits, since they correspond to $k = 1$. The regions inside which the electrons of the completed groups are moving are designated by circles. The atoms of the inert gases are added for the sake of comparison. The numbers at the left of the nucleus indicate the number of electrons contained in each group; the symbols $n_{1,1}$. at the right indicate the quantum numbers of the orbits contained in each group.

[For detailed calculations of electronic orbits, based on simplifying assumptions, see (12, 13, 20) (Cs and U); the work is semi-empirical. For detailed calculations on purely theoretical basis, see (15) (Ne, Na, Mg^+, Al^{++}, Si^{+++}, P^{++++}) and (16) (alkali metals); in Lindsay's work, the radii of outer groups in K^+, Rb^+, and Cs^+ seem too large, probably on account of inadequacy of assumptions regarding numbers of electrons in sub-groups, as well as of the simplifying assumptions made. For critical review of work on effective atomic radii, see (14) and for recent work (8). There is no simple direct connection between effective atomic radii and the magnitude of the space occupied by electronic orbits.]

In experiments on optical and X-ray spectra, we meet neutral atoms or atomic ions in **higher quantum states.** Several features of these states can be described on the simple central orbit model. In the case of "single excitation" all electronic orbits except one remain normal, and the other electron describes an orbit with quantum numbers which differ from those of the normal state. "Double excitation" corresponds to two electrons describing orbits different from those in the normal state, etc. We will here consider only singly-excited states.

In the stationary states (energy levels) involved in the emission of the ordinary X-ray spectra, one electron in the inner groups of the atom is lacking. In the states involved in the emission of the ordinary series-spectra, one electron belonging to the outermost group of the atom, the "series electron," moves in a central n_k orbit the dimensions of which are large as compared with those of the rest of the atom. It may move either quite outside the atomic residue or it may penetrate into it in each revolution.

As a first approximation, a non-penetrating orbit may be described as a Keplerian elliptical orbit performing a uniform precession in its plane, the shape of the ellipse being very nearly that of an n_k-orbit in an atom containing only one electron and having a nuclear charge Z^*e equal to the net-charge of the atomic residue. If the electron orbit is of the penetrating type, it may, as a first approximation, be described as a set of congruent outer Keplerian elliptical loops, connected by congruent inner loops, the angular distance between successive loops being the same. The semi-major axis, the semi-parameter p, and the semi-minor axis b of the outer loop can be found from the value of the corresponding spectral term (T) by means of the formulae

$$a = \frac{Z^*Nr_1}{T} \qquad p = \frac{k^2}{Z^*} r_1 \qquad b = \sqrt{ap} \tag{8}$$

where $N \left(= \frac{\nu_\infty}{c} \times \frac{1}{1 + m_0/M} \right)$ is the Rydberg constant for the element in question, and Z^*e is the net-charge of the atomic residue. If we introduce the effective quantum number n^* $(n^{*2} = Z^{*2}N/T)$, these formulae may be written:

$$a = \frac{n^{*2}}{Z^*} r_1 \qquad p = \frac{k^2}{Z^*} r_1 \qquad b = \frac{n^*k}{Z^*} r_1 \tag{9}$$

The greater the ratio n^*/k (or a/b) the closer the approximation to which this description of the outer loops may be considered to hold. The maximum distance of the electron from the nucleus is equal to $a + \sqrt{a^2 - b^2}$, or very nearly equal to $2a - \frac{1}{2}p$.

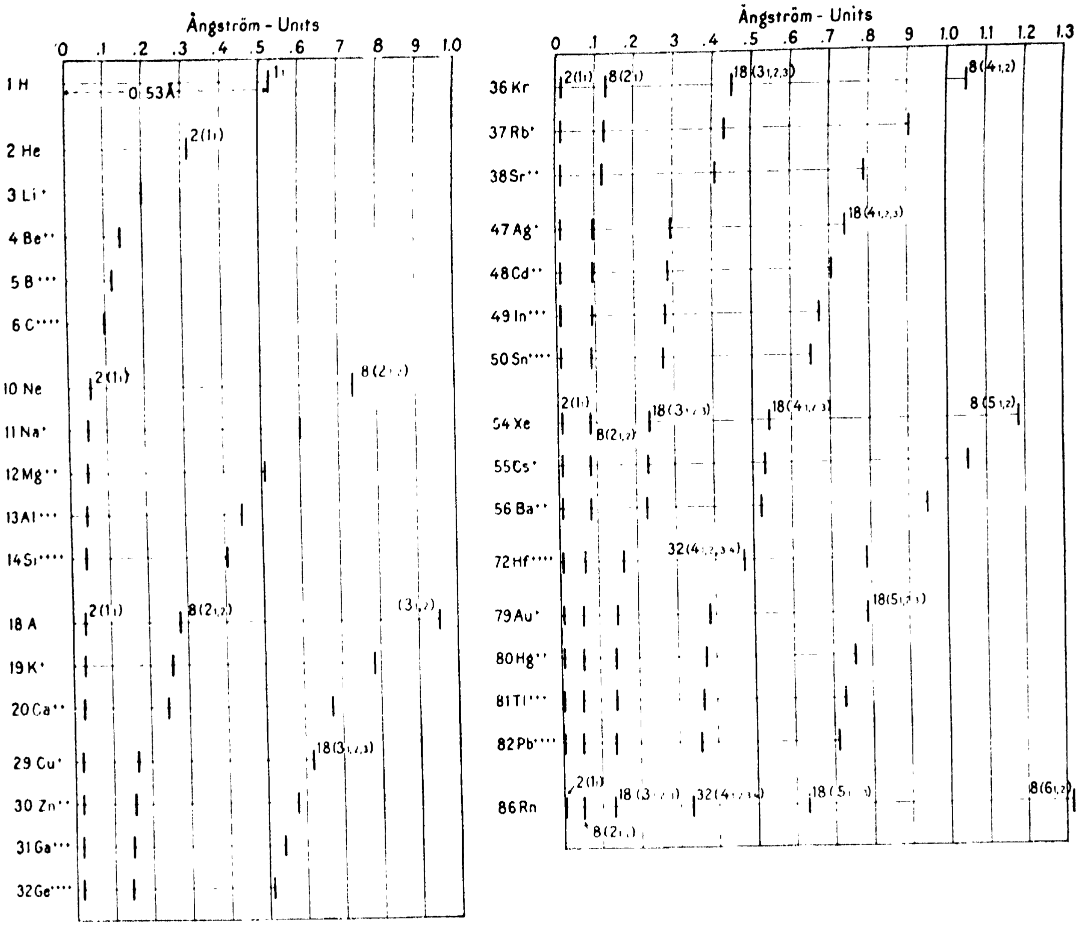


Fig. 3 Maximum elongations of electrons of several groups.

The values to be assigned to the precessional frequency characterizing the penetrating central orbits are very uncertain For the alkali elements, the ratio ω/σ for the n_1 orbits probably lies between 0.3 and 0.5, for the n_2 orbits (except lithium) between 0.5 and 1.0. Based on the above formulae, an illustration of the shapes of the orbits of the series electron corresponding to the stationary states of the K-atom, is given in Fig. 5. [For connection between spectra and the group structure of atoms, see (6, 5); for spectra and central field of force, see (12, 13); for series spectra and electronic orbits, see (2, 7); for recent development of formal theory of electronic groups, see (17, 19)].

SYMBOLS

The symbols **c**, **e**, **h**, **m**$_0$, λ have their usual significance (see p. 16); others which occur more than once are:

a_n	Semi-major axis of electronic orbit, state n.
$b_{n,k}$	Semi-minor axis of electronic orbit, state n, k.
k	Subordinate, or azimuthal, quantum number defining a stationary state.
M	Nuclear mass
n	Principal quantum number defining a stationary state.

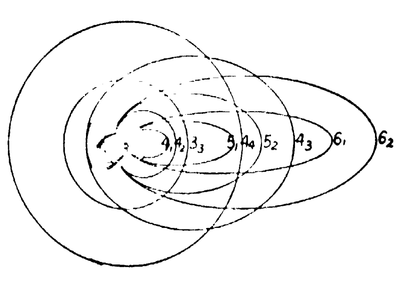


Fig. 5. - Orbits of the series electron of potassium. *(Reproduced by permission from The Journal of the Franklin Institute.)*

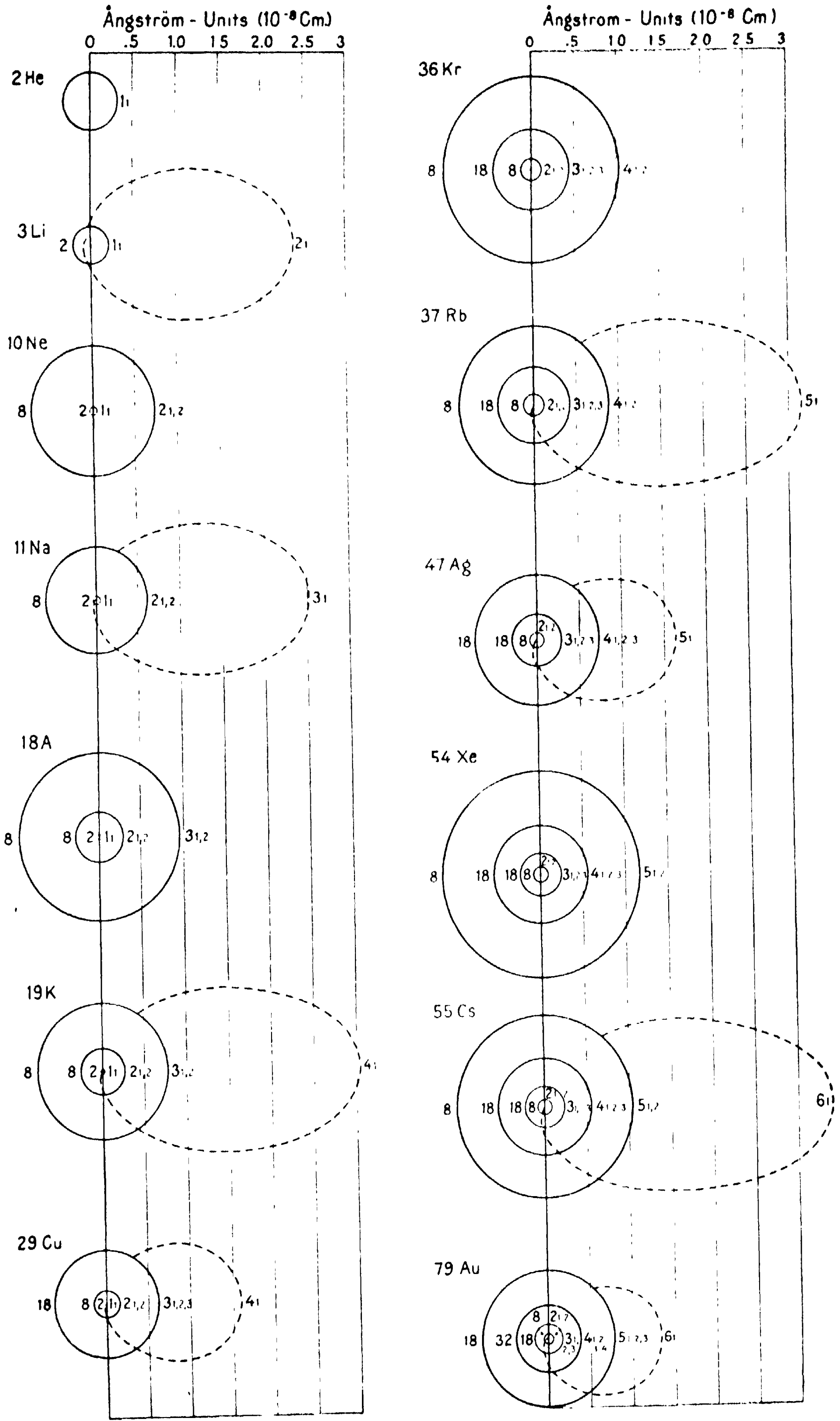

Ångström - Units (10⁻⁸ Cm)
0 .5 1.0 1.5 2.0 2.5 3
2 He
3 Li
10 Ne
11 Na
18 A
19 K
29 Cu
36 Kr
37 Rb
47 Ag
54 Xe
55 Cs
79 Au

Fig. 4.—Normal orbit of outer electron.

n^*	Effective quantum number = Z^*N/T.
n_k	Designation of the state characterized by the numbers n, k.
N_∞	Rydberg constant.
p	Semi-parameter of the electronic orbit (semi-latus rectum).
r_1	Radius of first Bohr ring for hydrogen.
T	Spectral term = a wave number $(1/\lambda)$ of a spectral series.
v	Speed of electron in its orbit
W_n	Energy expenditure required to remove the electron to infinity.
Z	Atomic number: Ze = nuclear charge.
Z^*e	Charge of atomic residue
α	$2\pi e^2/hc$.
β	$(1 - v^2/c^2)^{-1/2}$
ν	Frequency of emitted radiation.
ν_∞	Rydberg fundamental frequency.
$\sigma_{n,k}$	Frequency of precession of electronic orbit.
ω_n	Frequency of revolution of electron; for penetrating orbits, the radial frequency, one revolution being from A to B, Fig. 2.

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THERMOMETRY

E. F. MUELLER, L. H. ADAMS, F. O. FAIRCHILD AND H. T. WENSEL

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1. THERMOMETRIC SCALES

E. F. MUELLER

Centigrade or Celsius scale, °C

Fahrenheit scale, °F

Réamur scale, °R

Centigrade absolute or Kelvin scale, °K

Fahrenheit absolute or Rankine scale, °R′

By definition or as basic values adopted for I. C. T, the ice and steam points under a pressure of $1A_n$ have the following values:

Ice point: 0°C = 32°F = 0°R = 273.1°K = 491.58°R′.

Steam point: 100°C = 212°F = 80°R = 373.1°K = 703.58°R′.

$°C = {}^5\!/_9\,(°F - 32) = {}^5\!/_4\,°R = °K - 273.1.$

$°F = {}^9\!/_5\,°C + 32 = °R' - 459.58.$

2. THE STANDARD THERMODYNAMIC SCALE

E. F. MUELLER

The thermodynamic scale, which is based solely on the laws of thermodynamics and is independent of the properties of any material substance, is accepted as the standard scale of temperature. Temperatures on the thermodynamic scale are proportional to the pressures (or to the volumes) of an ideal gas in a perfect constant volume (or constant pressure) gas thermometer. The standard scale is realized in practice by use of gas thermometers, the indications of which can be reduced to the standard scale, or for higher temperatures, by use of the relations between the intensity of radiation from a black body and its temperature.

The experimental difficulties in the use of gas thermometers and the relatively low precision attainable in a single measurement have led to the introduction of a standard practical or working scale. This working scale is defined by certain base points, the temperatures of which have been determined by gas thermometer measurements, and by the indications of suitable instruments used for interpolation between the base points or for extrapolation to higher temperatures. It is possible in this way, without actually using a gas thermometer, to establish a working scale which does not differ to a demonstrable extent from the standard scale at any temperature within the range of the working scale. The practice of the various national standardizing laboratories in defining the working scale is substantially uniform at present, and it requires only minor adjustments and formal agreement to give the working scales of these laboratories the status of an international temperature scale. Such a scale would bear essentially the same relation to the standard scale, as do the international electric units to the absolute units.

The standard working scale may be defined by assigning numerical values to the temperatures defined by the boiling point of oxygen, the melting point of ice, the boiling point of water, the boiling point of sulfur, and the freezing points of antimony, silver and gold. The platinum resistance thermometer is the standard for interpolation in the range −195° to 0°C and from 0° to 650°C; the platinum-platinum rhodium thermocouple for the range from 650° to 1063°; and the luminous filament pyrometer above 1063°C.

Wien's law is accepted as expressing the brightness-temperature relation for a black body. For the purpose of defining the temperature scale above 1063°C the present practice of the national laboratories tends to favor the use of the value 1.430 cm degrees for the constant C_2 in this equation but the value 1.433 cm degrees has been adopted for I. C. T.

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Reduction of Gas Thermometer Indications to the Thermodynamic Scale

The temperature t_g on the scale of a constant volume or constant pressure gas thermometer filled with any real gas, is proportional to the pressure the gas would exert or the volume it would occupy, respectively, if all of the gas were at the uniform temperature to be measured, and if the volume or the pressure, respectively, were the same at all temperatures. At 0° and 100°C, the temperature t_g is by definition identical with the thermodynamic temperature t, while at other temperatures t_g departs from t by amounts which are proportional to the pressure at 0°, called the initial pressure. The tabular values are accordingly given only for an initial pressure equivalent to 1 m of mercury.

The values of $t - t_g$ obtained by various methods cover a wide range, so that only the order of magnitude of the values can be considered as known with any certainty. The tendency in modern work in gas thermometry has been to employ hydrogen or helium as the thermometric gas, and for these gases the magnitude of $- t_g$ is comparable with the experimental error of the gas thermometer itself, so that the importance of an exact knowledge of he departure of the scales of these gas thermometers from the hermodynamic scale is correspondingly reduced.

REDUCTION OF GAS THERMOMETER INDICATIONS, t_g, TO THE THERMODYNAMIC CENTIGRADE SCALE, t

Values of $t - t_g$ for an initial pressure of 1 meter of mercury

t °C	Helium		Hydrogen		Nitrogen	
	Const. vol.	Const. press.	Const. vol.	Const. press.	Const. vol.	Const. press.
- 250	+0.04	. .	+0 12			
- 200	+ .02	+0 04	+ 06	+0 3	+0 5	
- 150	+ .01	+ 02	+ 03	+ .1	+ 2	+1 3
- 100	+ .005	+ .005	+ 015	+ .04	+ 06	+ 4
- 50	+ .002	+ .002	+ 005	+ 02	+ 03	+ 12
0	000	.000	000	000	00	00
+ 25	− 001	− 001	− 001	− 003	− .008	− 02
50	− .001	.000	− 002	− 004	− .010	− 03
75	− 001	000	− 001	− 003	− .005	− 02
100	.000	000	000	000	000	00
150	+ .002	+ 001	+ 01	+ 01	+ .01	+ 05
200	+ 006	+ .001	+ .02	+ 02	+ 02	+ 12
250	+ .01	+ .002	.	+ 03	+ .04	+ 2
300	+ .02	+ .003	. .	+ 04	+ .07	+ 3
350	+ 03	+ .005			+ 10	+ 1
400	+ 04	+ 006	.		+ .14	+ 5
450	+ .05	+ .008			+ .17	+ 6
500	. .				+ 2	+ 7
600					+ 3	+ 9
800	.	.			+ 5	+1 3
1000	. .			.	+ 7	+1 8
1200	.				+1 0	+2 3

LITERATURE

(For a key to the periodicals see end of volume)

(¹)Rose-Innes, *3*, **2**: 131; 01. **15**: 301, 08. (²)Callendar, *3*, **5**: 48; 03. (³) Berthelot, *238*, **13B**: 113p ; 07. (⁴)Buckingham, *31A*, **3**: 237, 07. (⁵)Cath and Onnes, *168*, No. **156a**; 22. *18*, **6**: 1, 22. (⁶)Holborn and Otto, *96*, **23**: 77; 24. **30**: 320, 24 (⁷)Keesom and Onnes, *B60:* 15; 24.

3. FIXED POINTS

E. F. MUELLER

t = Temperature on standard scale.
p = Pressure in millimeters of Hg (1 mm Hg = 1/760 A_n) where p is between 680 and 780 mm.

BASE POINTS USED IN DEFINING THE STANDARD WORKING SCALE

(I. C. T. temperature scale)

Substance	Phenomenon	Temperature, °C
Liquid O_2	Vapor pressure	$t = \left[\begin{array}{l} -183.00 + 0.245\,(t + 273\ 1) \log_{10} p/760 \text{ or} \\ -183\ 00 + 0.0126\,(p - 760) - 0\ 0000065\,(p - 760)^2 \end{array}\right]$
Solid CO_2*	Vapor pressure	$t = \left[\begin{array}{l} -78\ 51 + 0\ 1443\,(t + 273.1) \log_{10} p/760 \text{ or} \\ -78\ 51 + 0.01595\,(p - 760) - 0\ 000011\,(p - 760)^2 \end{array}\right]$
Mercury*	Freezing	$t = -38\ 87°$
Ice	Melting	$t = 0\ 000°$
Steam	Condensing	$t = \left[\begin{array}{l} 100.000 + 0.1727\,(t + 273\ 1) \log_{10} p/760 \text{ or} \\ 100.000 + 0.0367\,(p - 760) - 0\ 000028\,(p - 760)^2 \end{array}\right]$
Sulfur	Condensing	$t = \left[\begin{array}{l} 444\ 60 + 0\ 2215\,(t + 273\ 1) \log_{10} p/760 \text{ or} \\ 444\ 60 + 0\ 0909\,(p - 760) - 0\ 000048\,(p - 760)^2 \end{array}\right]$
Antimony	Freezing	To be determined with resistance thermometer t = approx. 630.5°
Silver	Freezing	t = 960 5° (reducing atmosphere).
Gold	Freezing	t = 1063°

* Not needed according to one suggested definition of the scale.

SECONDARY FIXED POINTS USEFUL IN CALIBRATING TEMPERATURE MEASURING INSTRUMENTS

(I. C. T. temperature scale)

Substance	Phenomenon	Temperature °C
Hydrogen	Boiling	$t = -252.7_8 + 0.0044\,(p - 760)$
Nitrogen	Vapor pressure	$t = -195\ 80 + 0\ 0109\,(p - 760)$
Naphthalene	Condensing	$t = 217\ 96 + 0.207_8\,(t + 273.1) \log_{10}\,(p/760)$
Tin	Freezing	$t = 231\ 8_5$
Benzophenone	Condensing	$t = 305.9 + 0\ 194\,(t + 273.1) \log_{10}\,(p/760)$
Cadmium	Freezing	$t = 320\ 9$
Lead	Freezing	$t = 327.4$
Zinc	Freezing	$t = 419.4_8$
Aluminum (99.85 %)	Freezing	$t = 658.9$
Copper	Freezing	t = 1083 (reducing atmosphere)
Palladium	Freezing	$t = 1555 \pm 2$
Platinum	Melting	$t = 1755 \pm 6$
Tungsten	Melting	$t = 337_0 \pm 30$

The above values are in accord with the temperature scale used throughout I C T For the last three points the following slightly different values have been suggested for future adoption as secondary points on an international practical scale.

Substance	Phenomenon	Temperature
Palladium	Freezing	$t = \left[\begin{array}{l} 1555 \text{ for } C_2 = 1\ 430 \\ 1554 \text{ for } C_2 = 1\ 433 \end{array}\right]$
Platinum	Melting	$t = \left[\begin{array}{l} 1765 \text{ for } C_2 = 1.430 \\ 1763 \text{ for } C_2 = 1.433 \end{array}\right]$
Tungsten	Melting	$t = \left[\begin{array}{l} 3400 \text{ for } C_2 = 1\ 430 \\ 3386 \text{ for } C_2 = 1\ 433 \end{array}\right]$

Additional Useful Secondary Points

Substance	Formula	Phenomenon	Temperature, °C
Isopentane	C_5H_{12}	Freezing	− 159.6
Methylcyclohexane	$C_6H_{11}CH_3$	Freezing	− 126.3
Ether	$(C_2H_5)_2O$	Slow freezing (unstable)	− 123.3
Ether	$(C_2H_5)_2O$	Rapid freezing or slow melting	− 116.3
Carbon disulfide	CS_2	Freezing	− 111.6
Toluene	C_7H_8	Freezing	− 95.1
Ethyl acetate	$CH_3CO_2C_2H_5$	Freezing	− 83.6
Chloroform	$CHCl_3$	Freezing	− 63.5
Chlorobenzene	C_6H_5Cl	Freezing	− 45.2
Carbon tetrachloride	CCl_4	Freezing	− 22.9
Sodium sulfate	$Na_2SO_4 \cdot 10H_2O$	Transition	32.384
Potassium dichromate	$K_2Cr_2O_7$	*Melting*	*397.5*
30.5 NaCl + 69.5 Na₂SO₄		*Melting*	*637.0*
Potassium chloride	KCl	*Melting*	*770.3*
Sodium chloride	$NaCl$	*Melting*	*800.4*
Sodium sulfate	Na_2SO_4	*Melting*	*884.7*
Potassium sulfate	K_2SO_4	*Inversion*	*583.0*
Potassium sulfate	K_2SO_4	*Melting*	*1069.1*
Nickel	Ni	*Melting or freezing*	*1452*
Cobalt	Co	*Melting or freezing*	*1490*
Lithium metasilicate	Li_2SiO_3	Melting	1202
Diopside	$CaMgSi_2O_6$	Melting	1395
Anorthite	$CaAl_2Si_2O_8$	Melting	1555

LITERATURE

(For a key to the periodicals see end of volume)

(1) Holborn and Day, *8*, **2**: 505, 00 *12*, **10**: 171, 00 (Sb, Ag, Au, Cu) (2) Buckingham, *31A*, **3**: 281, 07 (Review of values for S boiling point). (3) Waidner and Burgess, *31A*, **7**: 1, 11 (Naphthalene, benzophenone, Sn, Cd, Zn) (4) Holborn and Henning, *8*, **35**: 761, 11 (Naphthalene, benzophenone, S, Sn, Cd, Zn) (5) Day and Sosman, *152*, No **157**; 11 (Zn, Sb, Ag, Au, Cu, Pd, Pt) (6) Day and Sosman, *12*, **33**: 517, 12 *8*, **38**: 849, 12 (Benzophenone, Zn, Sb, S). (7) Henning, *8*, **43**: 282, 14 (O, CO_2, Hg) (8) Eumorfopoulous, *5*, **90A**: 189; 14 (S) (9) Wilhelm, *31A*, **13**: 655, 16 (Hg)

(10) Chappuis, *238*, **16**: 17 (S) (11) Bureau of Standards, Cir No **66**; 17 (Sn, Zn, Al, Cu) (12) Cath, *168*, No **152d**; 18 *64P*, **21**: 656, 19 (O, N). (13) Martinez and Onnes, *168*, No **156b**; 22 *18*, **6** 31, 22 (H) (14) Worthing, *90*, **22**: 9, 24 (W) (15) Henning and Heuse, *8*, **23**: 104, 24 (O, N, H). (16) Finck and Wilhelm, *1*, **47**: 25 (Naphthalene, benzophenone) *See also* References under Standard Scale of Temperature.

Additional Fixed Points Timmermans, Van der Horst and Onnes, *168*, No **157**; **22** (Organic liquids below 0°). Dickinson and Mueller, *31A*, **3**: 641; 07 (Na_2SO_4 transition) Roberts, *2*, **23**: 386, 24 (Salts) Day and Sosman, Dictionary of Applied Physics, **1**: 836, 22 (Metals and silicates) Richards, *et al*, *1*, **36**: 485, 14 (Na_2CO_3 hydrates transitions) **40**: 89, 18 ($SrCl_2$ and $SrBr_2$ transitions) **41**: 2010, 19 (C_6H_6)

The Leiden Temperature Scale

In certain sections of International Critical Tables (where so indicated) the Leiden temperature scale will be employed. (Onnes and Holst, *168*, No **141a**. *64V*, **23**: 175; 14. Cath and Onnes, *168*, No. **152a**. *64V*, **26**: 137, 490; 17. Cath, *168*, No. **152d**. *64V*, **27**: 553; 18.) The relation between the Leiden and the I. C. T. scales is shown by the following table:

Point	I. C. T.	Leiden	Leiden − I. C. T.
H_2 (B. P.)	−252.8°	−252.74°	+0.06°
O_2 (B. P.)	−183.0°	−182.95°	+0.05°
ca. −40°			+0.04

4. RESISTANCE THERMOMETERS

E. F. Mueller

Standard methods of calibration have been developed only for platinum resistance thermometers. Data on the resistance-temperature relation for particular thermometers of other metals, such as gold and lead, are available, and formulae to represent the relation have been published, but standardized methods for the calibration of such thermometers have not been developed.

The standard working scale, in the interval 0° to 650°C, is defined by means of a resistance thermometer of pure platinum, for which the relation between resistance R and temperature t is given by the equation:

$$R = R_0(1 + at + bt^2). \tag{1}$$

This may be transformed into the Callendar equations:

$$(\mathrm{pt}) = \left(\frac{R - R_0}{R_{100} - R_0}\right)100;\ t - (\mathrm{pt}) = \delta\left[\left(\frac{t}{100} - 1\right)\frac{t}{100}\right]. \tag{2}$$

The three constants in these equations, namely R_0, a, and b or R_0, R_{100} and δ respectively, are determined by calibration at the ice point, the steam point, and the sulfur boiling point.

The purity of the platinum must be such that $R_{100}/R_0 > 1.390$ and $R_{444.6}/R_0 > 2.645$, the latter requirement being equivalent to $\delta < 1.50$.

The Callendar equations were devised to facilitate computations by the method of successive approximations. The platinum temperature, symbol (pt), is proportional to the resistance above R_0 and the amount by which it differs from the true temperature is given by the correction term,

$$\delta\left(\frac{t}{100} - 1\right)\frac{t}{100}.$$

Consequently, a value of t sufficiently exact for use in computing the value of the correction term is readily obtained, if not by the first, then certainly by a second or third approximation.

In the interval −195° to 0°C the standard reference scale is defined by means of the platinum resistance thermometer, using the equation

$$t - (\mathrm{pt}) = \delta\left[\left(\frac{t}{100} - 1\right)\frac{t}{100}\right] + \beta\left[\left(\frac{t}{100} - 1\right)\frac{t^3}{100^3}\right]. \tag{3}$$

The constants R_0, R_{100} and δ are determined just as for the range above 0° and the additional constant β is determined by a calibration at the boiling point of oxygen. A criterion for the purity of the platinum is that $R_{-183}/R_0 < 0.250$.

Thermometers which are not to be heated above ordinary temperatures may be calibrated at the freezing point of mercury, the CO_2 point and the oxygen point, using the interpolation formula:

$$R = R_0(1 + at + bt^2 + ct^4). \tag{4}$$

The constant c in the equation is approximately equal to 5×10^{-12} and when this value is assumed, calibration at the CO_2 point may be omitted.

Equations (3) and (4) will yield substantially equivalent results, but they are not algebraically interconvertible.

Equation (1) or equation (2) may be used for temperatures up to 1000° or even 1100°C and the temperatures so determined will not depart appreciably from the standard scale.

LITERATURE

(For a key to the periodicals see end of volume)

(1) Callendar, *62*, **178**: 160; 87. (2) Waidner and Burgess, *31A*, **6**: 149; 09. (3) Holborn and Henning, *8*, **35**: 761, 11. (4) Henning, *8*, **40**: 635; 13 (Pt and Pb at low temperatures). (5) Henning, *8*, **43**: 282; 14. (6) Cath, Onnes and Burgers, *168*, No **152c**; 17 *64P*, **20**, 1163, 18 (Pt and Au at low temperatures) (7) Henning and Heuse, *96*, **23**: 95; 24. (8) Van Dusen, *1*, **47**: 326, 25

5. TEMPERATURE SCALES DEFINED BY LIQUID-IN-GLASS THERMOMETERS

E. F. Mueller

The readings of any particular thermometer, taken when all of the liquid in the thermometer is at a uniform temperature, may be reduced to those which would have been obtained if the thermometer had been perfect and used under ideal conditions, by applying corrections for non-uniformity of the capillary bore, corrections for the change of reading due to departure of the external and internal pressures from arbitrary constant values, a correction for the departure of the ice-point reading, taken immediately *after* the temperature measurement, from the 0° mark, and

a correction to allow for the value of the mean scale degree, in case the difference between the readings of the thermometer taken first at 100°C and then at 0°C, does not correspond to 100 scale degrees. The reading of a thermometer, when so corrected, may be defined as the temperature on the liquid-in-glass scale for the particular liquid and the particular kind of glass of which the thermometer is made.

The temperature scales of mercury thermometers made of French hard glass (verre dur), Jena 16^{III}, Jena 59^{III}, Jena 1565^{III} and Jena combustion tubing are defined as above. For Kew glass, the temperature scale is defined in a somewhat different way, in that the point of reference is the (single) ice point reading taken after the thermometer has been held for a sufficiently long period at ordinary temperature (about 10°C) instead of the *(variable) ice point reading taken immediately after each temperature measurement. It is apparent that temperatures on the mercury-in-glass scale are not proportional to the relative increase of volume of mercury-in-glass.*

Constants characteristic of the several glasses are the ice-point depression, the softening point, and the average coefficient of expansion of mercury-in-glass, between 0° and 100°C.

The ice point depression is the difference between the ice point reading of the thermometer taken after it has been kept a sufficiently long time (a few days or weeks) at 0° and the ice point reading taken immediately after the thermometer has been kept a sufficiently long time (a few minutes or hours) at 100°C. Good thermometric glasses are characterized by small ice point depression (less than 0.1°C) and rapid recovery. Some glasses have an ice point depression of nearly 1°C.

The softening point determines the upper limit of temperature at which thermometers made of the glass can be used

The expansion coefficient is useful in calculating corrections for emergent stem.

Values of these characteristic constants are.

Glass	Ice point depression °C	Softening point °C	Coefficient of cubical exp. of mercury-in-glass 0° to 100°C
Verre dur ...	0.07-0.11	500	0.000158
"Kew" glass	0.20		
Jena 16^{III} . .	0.04-0.08	505	0.000158
Jena 59^{III}	0.03-0.04	510	0.000164
Jena 1565^{III}	0.01	660	0.000172
Jena combustion	0.03	560	

Thermometers containing alcohol, toluene or pentane are not adapted for observation at 100°C, and for such thermometers the mean scale degree is conveniently referred to the interval 0° to −78.5°, the sublimation temperature of carbon dioxide serving to fix the latter temperature.

The tabular values are the result of comparisons of mercury-in-glass thermometers with gas thermometers or platinum resistance thermometers which served to establish the standard scale of temperature. The data for Jena 16^{III} glass and Jena 59^{III} glass may be used for Corning normal and Corning borosilicate thermometer glasses respectively.

Data of this kind were of great importance during the latter part of the 19th and even during the early part of this century, when calibrated mercury-in-glass thermometers were used to distribute the standard scale of temperature. At present the data are useful principally for minor purposes, such as calculation of factors for determining emergent stem correction, calculation of setting factors for metastatic thermometers, such as the Beckmann thermometer, graduation of thermometers by mercury thread calibration in the absence of standards and thermally controlled baths, etc.

In the tables, t represents the temperature on the standard working scale (platinum resistance thermometer) except for verr dur, where t represents temperatures on the former Internationa hydrogen scale, which in practice is not distinguishable fro the standard reference scale, while t_{gl} represents correspondin temperatures on the several liquid-in-glass scales.

VALUES OF $t - t_{gl}$ FOR MERCURY-IN-GLASS THERMOMETERS

t = temperature on standard scale, t_{gl} = temperature on mercury-in-glass scale.

t°C	French hard (verre dur)	Kew glass	Jena 16^{III}	Jena 59^{III}	Jena 1565^{III}	Jena combustio
−39	+0.120					
−30	+ .290		+0.28	+0.13		
−20	+ .172		+ .16	+ .07		
−10	+ .073		+ .07	+ .03		
0	.000	0.00	.00	.00	0.00	0.00
+10	− .052	.00	− .06	− .02	− .03	
20	− .085	.00	− .09	− .04	− .05	
30	− .102	+ .005	.11	− .04	− .06	
40	− .107	+ .01	.12	.03	− .06	
50	− .103	+ .01	− .12	− .03	− .05	
60	− .090	+ .01	− .10	− .02	− .04	
70	− .072	+ .015	− .08	− .01	− .03	
80	− .050	+ .02	− .06	.00	− .02	
90	− .026	+ .025	.03	+ .02	− .01	
100	.000	.00	.00	.00	.00	0.00
120	+ .06		+ .03	.05	+ .06	
140	+ .07		+ .02	− .16	+ .03	
160	+ .03		− .02	.31	− .13	
180	− .04		− .12	− .52	− .38	
200	− .12		− .29	.84	− .90	− 1.13
220			− .5	− 1.3	− 1.3	− 1.6
240			− .9	1.9	− 1.8	− 2.2
260			−1.4	− 2.6	− 2.4	− 3.0
280			−2.0	3.4	3.1	− 4.0
300			−2.7	4.4	− 3.9	− 5.1
320				5.8	− 4.8	− 6.4
340				7.2	− 5.9	− 7.8
360				− 8.8	− 7.3	− 9.5
380				10.6	− 8.9	−11.4
400				−12.6	−10.5	−13.5
420				14.9	−12.4	−15.9
440				−17.4	−14.7	−18.6
460				−20.2	−17.2	−21.5
480				−23.3	−20.0	−24.8
500				−26.9	−23.1	−28.4
550					−32	−39.
600					−44	
650					−58	

VALUES OF $t - t_g$ FOR LIQUID-IN-GLASS THERMOMETERS

t	Pentane in 16^{III} glass	Toluene in verro dur	Alcohol in verre dur
−190	−23.4		
−180	−21.0		
−170	−18.6		
−160	−16.2		
−150	−13.9		
−140	−11.6		
−130	− 9.4		
−120	− 7.3		
−110	− 5.3		

Values of $t - t_1$ for Liquid-in-glass Thermometers.—*Continued*

t	Pentane in 16^{III} glass	Toluene in verre dur	Alcohol in verre dur
−100	−3.4		
−90	−1.7		
−80	−0.2	0.0	
−78.5	0.0	0.0	0.0
−70	+1.0	+ 4	+0.3
−60	+2.0	+ 8	+ 6
−50	+2.6	+1.1	+ 7
−40	+3.0	+1.2	+ .9
−30	+2.9	+1.2	+ 9
−20	+2.4	+1.0	+ .8
−10	+1.5	+0.6	+ 5
0	0.0	0.0	.0
+10	2.0		
20	−4.4		
30	−7.6		−3.6
100		−24.4	

LITERATURE

(For a key to the periodicals see end of volume)

Guillaume, Traité pratique de la thermométrie. Gauthier-Villars, Paris, 1889 (General). Chappuis, *238*, **6**: 1, 88 (Verre dur −25° to 100°). Harker, *5*, **78A**: 225; 06 (Kew glass). Scheel, *Deut. Mechan. Ztg.*, **1916**: 170 and Holborn, Scheel and Henning, *R63* (Jena glasses and organic liquids in glass).

Emergent Stem Correction for Liquid-in-glass Thermometers

If a liquid-in-glass thermometer standardized for total immersion is used with a portion of the liquid column at a temperature below that of the bulb, the reading will be too low for this reason, and an emergent stem correction should be applied to the observed reading.

The emergent stem correction is calculated by the formula,

$$\text{Correction} = Kn(t - t_s)$$

in which

K = coefficient of cubical expansion of mercury-in-glass, per °C,

t = temperature of bulb, °C,

t_s = average temperature °C of the mercury column n°C degrees in length.

The value of t is to be determined by means of an auxiliary thermometer or thermometers, preferably with a capillary thermometer. The sign as well as the magnitude of the correction is given by the formula.

For many purposes, in using mercury-in-glass thermometers K may be treated as a constant of the glass, using the values given above for the apparent coefficient of expansion of mercury-in-glass. The value of K does, however, change with temperature. For purposes of computing the emergent stem correction, it may be considered as depending on the average of t and t_s, that is $\frac{t + t_s}{2}$ and is here so tabulated.

If the coefficients of expansion of mercury and of glass were both constant, K would also be constant. Most of the change in K is the result of the varying coefficient of the mercury, so that the change in K with temperature for one glass may with some certainty be inferred from the change for some other glass.

The use of the formula requires that t, the temperature of the bulb, be known. In case t is not known, but is to be determined from the indication of the thermometer, the reading of the thermometer may be substituted in the formula in place of t, as a first approximation and the true magnitude of the correction then calculated by means of a second, or if necessary, a third approximation.

In many cases, in calculating the emergent stem correction for thermometers containing organic liquids, it is sufficient to use the approximate value, $K = 0.001$. The tables show to what extent this is justified for pentane, toluene, and alcohol. In such thermometers, K is practically independent of the kind of glass used.

With the abandonment of the mercury-in-glass thermometer as an instrument of high precision there has been an increasing tendency to use partial immersion thermometers, graduated and standardized for a particular depth of immersion, thus avoiding the necessity of determining and applying the correction for emergent stem.

Table of Emergent Stem Correction Factors

Mercury-in-glass Thermometers

$\frac{t + t_s}{2}$ °C	Verre dur	Jena 16^{III}	Jena 59^{III}	Jena 1565^{III}	Jena combustion
50	0.000158	0.000158	0.000164	0.000172	0.000164
100	158	158	164	172	164
150	158	158	165	173	165
200	159	159	167	175	167
250		161	170	177	171
300		164	171	180	174
350			177	184	178
400			182	188	182
450			187	194	188
500			195	200	195

Liquid-in-glass Thermometers

$\frac{t + t_s}{2}$	Pentane	Toluene	Alcohol
−180	0.0009		
−160	09		
−140	09		
−120	10		
−100	10		
−80	10	0.0009	0.0010
−60	11	09	10
−40	12	10	10
−20	13	10	10
0	14	10	10
+20	15	11	10

LITERATURE

(For a key to the periodicals see end of volume)

Buckingham, *31a*, **3**: 239, 12

Example: A thermometer of Jena 59^{III} (or Corning borosilicate glass) indicated a temperature, t, of 470° after application of corrections peculiar to the instrument. The thermometer was immersed to the 150° mark, and the *average* temperature t_s of the 320° (n°) of exposed mercury column was found to be 190°. The average of t and t_s is 330° and the value of the factor K for this temperature is 0.000176. Accordingly

$$\text{Correction} = 0.000176(320)(470 - 190) = 15.8°$$

The corrected temperature is therefore 470° + 15.8° = 485.8°. Since the bulb temperature was considerably higher than 470° a second approximation may be tried:

$$\text{Correction} = 0.000176(320)(486 - 190) = 16.7°$$

The second approximation yields a corrected temperature of 470° + 16.7° = 486.7° which in view of the rather large emergent stem correction, may properly be reported as 487°.

Possible short cuts in making the second approximation will be readily apparent.

The example given is purposely somewhat exaggerated by assuming an unusually high temperature (190°) for the emergent stem, in order to show that the factor K may differ appreciably from the conventional value of 0.00016.

For computations in Fahrenheit temperatures, the proper value of K is $\frac{5}{9}$ of the tabulated value.

6. THERMOCOUPLES

L. H. Adams

"Standard" Calibration Tables (for Use with Deviation Curve)

Standard tables such as these do not necessarily have any absolute significance; primarily, they are arbitrary reference curves which, although representing fairly well the temperature-emf functions for certain thermocouples, are intended for use with an appropriate deviation-curve. This correction-curve is determined for each couple by calibration at several—preferably three or more—fixed points within the "applicability range of the couple." This curve is constructed by plotting ΔE as ordinate ($\Delta E = E_{obs.} - E_{stand}$) against E_{stand} as abscissa. In order to obtain the temperature corresponding to the emf indicated by the couple, the appropriate value of ΔE (as obtained from its deviation curve) is subtracted algebraically from the observed value of E before the latter is converted into degrees by means of the table. Example: At a certain temperature a copper-constantan couple gave an emf of 8720 microvolts. From the previously determined deviation curve of the particular couple the value of ΔE at 8720 microvolts is found to be 12 microvolts. The "standard" emf is therefore 8720 − 12 or 8708 microvolts and from the copper-constantan table this may be seen to correspond to 189.08°, which is the required temperature.

The fixed (*i.e.*, cold) junction is supposed to be maintained at 0°C.

Temperatures and Temperature Differences for Every 100 Microvolts

Platinum: Platinrhodium (90–10). Standard range, 630°–1083°C. Applicability range, 0–1754°C

E µV	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	E µV
0	0	147.1	265.4	374.3	478.1	578.3	675.3	769.5	861.1	950.4	0
	17.8	12.6	11.2	10.6	10.2	9.8	9.5	9.3	9.0	8.8	
100	17.8	159.7	276.6	384.9	488.3	588.1	684.8	778.8	870.1	959.2	100
	16.7	12.4	11.1	10.5	10.1	9.8	9.5	9.2	9.0	8.8	
200	34.5	172.1	287.7	395.4	498.4	597.9	694.3	788.0	879.1	968.0	200
	15.8	12.3	11.0	10.5	10.1	9.8	9.5	9.2	9.0	8.7	
300	50.3	184.3	298.7	405.9	508.5	607.7	703.8	797.2	888.1	976.7	300
	15.1	12.0	11.0	10.4	10.1	9.7	9.5	9.2	9.0	8.7	
400	65.4	196.3	309.7	416.3	518.6	617.4	713.3	806.4	897.1	985.4	400
	14.6	11.8	10.9	10.4	10.0	9.7	9.4	9.2	9.0	8.7	
500	80.0	208.1	320.6	426.7	528.6	627.1	722.7	815.6	906.1	994.1	500
	14.1	11.6	10.9	10.4	10.0	9.7	9.4	9.1	8.9	8.7	
600	94.1	219.7	331.5	437.1	538.6	636.8	732.1	824.7	915.0	1002.8	600
	13.7	11.5	10.8	10.3	10.0	9.7	9.4	9.1	8.9	8.7	
700	107.8	231.2	342.3	447.4	548.6	646.5	741.5	833.8	923.9	1011.5	700
	13.4	11.5	10.7	10.3	9.9	9.6	9.4	9.1	8.9	8.6	
800	121.2	242.7	353.0	457.7	558.5	656.1	750.9	842.9	932.8	1020.1	800
	13.1	11.4	10.7	10.2	9.9	9.6	9.3	9.1	8.8	8.6	
900	134.3	254.1	363.7	467.9	568.4	665.7	760.2	852.0	941.6	1028.7	900
	12.8	11.3	10.6	10.2	9.9	9.6	9.3	9.1	8.8	8.6	
1000	147.1	265.4	374.3	478.1	578.3	675.3	769.5	861.1	950.4	1037.3	1000

E µV	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000		E µV
0	1037.3	1122.2	1205.9	1289.3	1372.4	1454.8	1537.5	1620.9	1704.3		0
	8.6	8.4	8.3	8.4	8.3	8.2	8.3	8.3	8.3	...	
100	1045.9	1130.6	1214.2	1297.7	1380.7	1463.0	1545.8	1629.2	1712.6	...	100
	8.5	8.4	8.4	8.3	8.3	8.2	8.3	8.4	8.4	....	
200	1054.4	1139.0	1222.6	1306.0	1389.0	1471.2	1554.1	1637.6	1721.0	.	200
	8.5	8.4	8.3	8.3	8.3	8.2	8.3	8.3	8.3	...	
300	1062.9	1147.4	1230.9	1314.3	1397.3	1479.4	1562.4	1645.9	1729.3	.	300
	8.5	8.4	8.4	8.3	8.3	8.3	8.4	8.4	8.4	..	
400	1071.4	1155.8	1239.3	1322.6	1405.6	1487.7	1570.8	1654.3	1737.7	...	400
	8.5	8.4	8.3	8.3	8.2	8.3	8.3	8.3	8.3	...	
500	1079.9	1164.2	1247.6	1330.9	1413.8	1496.0	1579.1	1662.6	1746.0	...	500
	8.5	8.3	8.3	8.3	8.2	8.3	8.4	8.3	8.3	...	
600	1088.4	1172.5	1255.9	1339.2	1422.0	1504.3	1587.5	1670.9	1754.3	. .	600
	8.5	8.4	8.4	8.3	8.2	8.3	8.3	8.4		...	
700	1096.9	1180.9	1264.3	1347.5	1430.2	1512.6	1595.8	1679.3	....	..	700
	8.5	8.3	8.3	8.3	8.2	8.3	8.4	8.3	...	...	
800	1105.4	1189.2	1272.6	1355.8	1438.4	1520.9	1604.2	1687.6	...	.	800
	8.4	8.4	8.4	8.3	8.2	8.3	8.3	8.4	....		
900	1113.8	1197.6	1281.0	1364.1	1446.6	1529.2	1612.5	1696.0	.	.	900
	8.4	8.3	8.3	8.3	8.2	8.3	8.4	8.3	....	. .	
1000	1122.2	1205.9	1289.3	1372.4	1454.8	1537.5	1620.9	1704.3	....	. .	1000

TEMPERATURES AND TEMPERATURE DIFFERENCES FOR EVERY 100 MICROVOLTS

Copper: Constantan

E μV	−5000	−4000	−3000	−2000	−1000	−0	0	1000	2000	3000	4000	5000	6000
0	−169.14	−124.46	−87.86	−55.81	−26.82	0	0	25.27	49.20	72.08	94.07	115.31	135.91
	5.20	*4.01*	*3.42*	*3.05*	*2.79*	*2.60*	*2.59*	*2.45*	*2.33*	*2.23*	*2.16*	*2.09*	*2.03*
100	−174.34	−128.47	−91.28	−58.86	−29.61	−2.60	2.59	27.72	51.53	74.31	96.23	117.40	137.94
	5.40	*4.09*	*3.46*	*3.08*	*2.81*	*2.62*	*2.57*	*2.43*	*2.32*	*2.23*	*2.15*	*2.08*	*2.02*
200	−179.74	−132.56	−94.74	−61.94	−32.42	−5.22	5.16	30.15	53.85	76.54	98.38	119.48	139.96
	5.64	*4.18*	*3.51*	*3.11*	*2.84*	*2.63*	*2.56*	*2.42*	*2.31*	*2.22*	*2.14*	*2.08*	*2.02*
300	−185.38	−136.74	−98.25	−65.05	−35.26	−7.85	7.72	32.57	56.16	78.76	100.52	121.56	141.98
	5.89	*4.28*	*3.57*	*3.15*	*2.86*	*2.65*	*2.55*	*2.41*	*2.30*	*2.21*	*2.14*	*2.07*	*2.01*
400	−191.27	−141.02	−101.82	−68.20	−38.12	−10.50	10.27	34.98	58.46	80.97	102.66	123.63	143.99
	6.17	*4.39*	*3.63*	*3.19*	*2.89*	*2.67*	*2.53*	*2.40*	*2.30*	*2.20*	*2.13*	*2.06*	*2.01*
500	−197.44	−145.41	−105.45	−71.39	−41.01	−13.17	12.80	37.38	60.76	83.17	104.79	125.69	146.00
	6.51	*4.50*	*3.68*	*3.22*	*2.90*	*2.69*	*2.52*	*2.39*	*2.28*	*2.20*	*2.12*	*2.06*	*2.00*
600	−203.95	−149.91	−109.13	−74.61	−43.91	−15.86	15.32	39.77	63.04	85.37	106.91	127.75	148.00
	6.97	*4.61*	*3.74*	*3.26*	*2.93*	*2.71*	*2.51*	*2.38*	*2.27*	*2.19*	*2.11*	*2.05*	*2.00*
700	−210.92	−154.52	−112.87	−77.87	−46.84	−18.57	17.83	42.15	65.31	87.56	109.02	129.80	150.00
	7.55	*4.73*	*3.80*	*3.29*	*2.96*	*2.73*	*2.49*	*2.36*	*2.27*	*2.18*	*2.10*	*2.04*	*1.99*
800	−218.47	−159.25	−116.67	−81.16	−49.80	−21.30	20.32	44.51	67.58	89.74	111.12	131.84	151.99
		4.87	*3.86*	*3.33*	*2.99*	*2.75*	*2.48*	*2.35*	*2.25*	*2.17*	*2.10*	*2.04*	*1.99*
900		−164.12	−120.53	−84.49	−52.79	−24.05	22.80	46.86	69.83	91.91	113.22	133.88	153.97
		5.02	*3.93*	*3.37*	*3.02*	*2.77*	*2.47*	*2.34*	*2.25*	*2.16*	*2.09*	*2.03*	*1.98*
1000		−169.14	−124.46	−87.86	−55.81	−26.82	25.27	49.20	72.08	94.07	115.31	135.91	155.95

E μV	7000	8000	9000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000
0	155.95	175.50	194.62	213.36	231.74	249.82	267.60	285.13	302.42	319.49	336.36	353.08	369.61
	1.97	*1.93*	*1.89*	*1.85*	*1.82*	*1.79*	*1.76*	*1.74*	*1.72*	*1.70*	*1.68*	*1.66*	*1.64*
100	157.92	177.43	196.51	215.21	233.56	251.61	269.36	286.87	304.14	321.19	338.04	354.74	371.25
	1.97	*1.93*	*1.89*	*1.85*	*1.82*	*1.79*	*1.76*	*1.74*	*1.71*	*1.69*	*1.68*	*1.66*	*1.64*
200	159.89	179.36	198.40	217.06	235.38	253.40	271.12	288.61	305.85	322.88	339.72	356.40	372.89
	1.97	*1.92*	*1.88*	*1.85*	*1.82*	*1.78*	*1.76*	*1.74*	*1.71*	*1.69*	*1.68*	*1.66*	*1.64*
300	161.86	181.28	200.28	218.91	237.20	255.18	272.88	290.35	307.56	324.57	341.40	358.06	374.53
	1.96	*1.92*	*1.88*	*1.84*	*1.81*	*1.78*	*1.76*	*1.73*	*1.71*	*1.69*	*1.67*	*1.66*	*1.64*
400	163.82	183.20	202.16	220.75	239.01	256.96	274.64	292.08	309.27	326.26	343.07	359.72	376.17
	1.96	*1.91*	*1.88*	*1.84*	*1.81*	*1.78*	*1.76*	*1.73*	*1.71*	*1.69*	*1.67*	*1.65*	*1.63*
500	165.78	185.11	204.04	222.59	240.82	258.74	276.40	293.81	310.98	327.95	344.74	361.37	377.80
	1.95	*1.91*	*1.87*	*1.84*	*1.81*	*1.78*	*1.75*	*1.73*	*1.71*	*1.69*	*1.67*	*1.65*	*1.63*
600	167.73	187.02	205.91	224.43	242.63	260.52	278.15	295.54	312.69	329.64	346.41	363.02	379.43
	1.95	*1.91*	*1.87*	*1.83*	*1.80*	*1.77*	*1.75*	*1.72*	*1.70*	*1.68*	*1.67*	*1.65*	*1.63*
700	169.68	188.93	207.78	226.26	244.43	262.29	279.90	297.26	314.39	331.32	348.08	364.67	381.06
	1.94	*1.90*	*1.86*	*1.83*	*1.80*	*1.77*	*1.75*	*1.72*	*1.70*	*1.68*	*1.67*	*1.65*	*1.63*
800	171.62	190.83	209.64	228.09	246.23	264.06	281.65	298.98	316.09	333.00	349.75	366.32	382.69
	1.94	*1.90*	*1.86*	*1.83*	*1.80*	*1.77*	*1.74*	*1.72*	*1.70*	*1.68*	*1.67*	*1.65*	*1.63*
900	173.56	192.73	211.50	229.92	248.03	265.83	283.39	300.70	317.79	334.68	351.42	367.97	384.32
	1.94	*1.89*	*1.86*	*1.82*	*1.79*	*1.77*	*1.74*	*1.72*	*1.70*	*1.68*	*1.66*	*1.64*	*1.63*
1000	175.50	194.62	213.36	231.74	249.82	267.60	285.13	302.42	319.49	336.36	353.08	369.61	385.95

Temperatures and Temperature Differences for Every 0.5 Millivolt

Chromel-alumel

E mv	0	10	20	30	40
0	0.0	244.5	482.8	719.2	970.4
	12.3	*12.2*	*11.7*	*12.2*	*13.0*
0.5	12.3	256.7	494.5	731.4	983.4
	12.1	*12.2*	*11.7*	*12.3*	*13.1*
1.0	24.4	268.9	506.2	743.7	996.5
	12.0	*12.1*	*11.7*	*12.3*	*13.2*
1.5	36.4	281.0	517.9	756.0	1009.7
	12.0	*12.1*	*11.7*	*12.3*	*13.3*
2.0	48.4	293.1	529.6	768.3	1023.0
	12.0	*12.0*	*11.7*	*12.4*	*13.3*
2.5	60.4	305.1	541.3	780.7	1036.3
	12.0	*12.0*	*11.7*	*12.4*	*13.4*
3.0	72.4	317.1	553.0	793.1	1049.7
	12.0	*12.0*	*11.7*	*12.5*	*13.5*
3.5	84.4	329.1	564.7	805.6	1063.2
	12.0	*11.9*	*11.7*	*12.5*	*13.6*
4.0	96.4	341.0	576.4	818.1	1076.8
	12.1	*11.9*	*11.8*	*12.5*	*13.7*
4.5	108.5	352.9	588.2	830.6	1090.5
	12.1	*11.9*	*11.8*	*12.6*	*13.7*
5.0	120.6	364.9	600.0	843.2	1104.2
	12.2	*11.9*	*11.8*	*12.6*	*13.8*
5.5	132.8	376.8	611.8	855.8	1118.0
	12.4	*11.9*	*11.8*	*12.6*	*13.8*
6.0	145.2	388.6	623.6	868.4	1131.8
	12.5	*11.8*	*11.8*	*12.6*	*13.9*
6.5	157.7	400.4	635.4	881.0	1145.7
	12.6	*11.8*	*11.8*	*12.7*	*13.9*
7.0	170.2	412.2	647.2	893.7	1159.6
	12.5	*11.8*	*11.9*	*12.7*	*14*
7.5	182.7	424.0	659.1	906.4	(1174)
	12.5	*11.8*	*11.9*	*12.7*	*14*
8.0	195.2	435.8	671.0	919.1	(1188)
	12.4	*11.8*	*12.0*	*12.8*	*14*
8.5	207.7	447.6	683.0	931.9	(1202)
	12.3	*11.8*	*12.0*	*12.8*	
9.0	220.0	459.4	695.0	944.7	
	12.3	*11.7*	*12.1*	*12.8*	
9.5	232.3	471.1	707.1	957.5	
	12.2	*11.7*	*12.1*	*12.9*	
10.0	244.5	482.8	719.2	970.4	

Fixed-junction Corrections

If the fixed or "cold" junction be not maintained at 0°C, a correction must be applied. This may be done by any one of several methods, of which the following are suggested.

A. Let the temperature of the fixed junction be t_c and that of the variable or "hot" junction be t. Then to the emf as read E_{t-t_c}, add the emf corresponding to t_c. This gives E_t which may at once be converted into degrees by means of the proper table.

B. Multiply the fixed-junction temperature by the factor, $f = (dE/dt)_0/(dE/dt)$, which is the ratio of the mean emf-temperature gradient between 0° and t_c to the gradient at t, and add the product to t', the uncorrected temperature. That is, $t = t' + ft_c$. These emf-temperature gradients may be obtained by taking the reciprocals of the numbers appearing in the difference columns of the calibration tables.

Comparison of the More Common Thermocouples

E mv	Temperature, °C				E mv	Temperature, °C		
	Iron: constantan	Chromel (X): copel	Chromel (P): alumel	Platinrhodium:* gold-palladium		Platinum: platinrhodium (Heraeus)	Platinum: Platinrhodium (Johnston-Matthey)	Copper: constantan
0	0	0	0	0	0	0	0	0
5	95	105	121	131	1	147	146	25
10	186	195	244	237	2	265	260	49
15	277	277	365	335	3	374	364	72
20	367	353	483	429	4	478	461	94
25	457	425	600	513	5	578	553	115
30	546	495	719	607	6	675	641	136
35	632		843	694	7	769	725	156
40	713		970	779	8	861	806	176
45	792		1104	866	9	950	884	195
50	871			954	10	1037	959	213
55	950			1044	11	1122	1032	232
60				1136	12	1206	1103	250
					13	1289	1173	268
					14	1372	1242	285
					15	1455	1311	302
					16	1537	1379	320
					17	1620	1447	336
					18	1704	1515	353

* 10 % Rh, 40 % Pd.

LITERATURE

(For a key to the periodicals see end of volume)

(1) Adams, *128*, **3**: 469; 13. *1*, **36**: 65; 14. *255*, **1919**: 2111. (2) Adams, *O*. (3) Adams and Johnston, *12*, **32**: 534; 12. (4) Foote, Fairchild and Harrison, *32*, No **170**, 21. (5) Hoskins Mfg Co, Catalog D; 24. (6) Roberts, *O*. (7) Sosman, *12*, **30**: 7, 10.

OPTICAL PYROMETRY

C. O. Fairchild and H. T. Wensel

The temperature scale above the melting point of gold is based upon Wien's Law, $J_{\lambda} = c_1\lambda^{-5}e^{-\frac{C_2}{\lambda T}}$, in which the constant C_2 (1.433 cm deg) and the value 1336°K for the melting point of gold determine the scale. In optical pyrometry temperatures are usually measured by comparing the brightness of a glowing object with that of the filament of a lamp mounted in the image plane of a simple telescope. For highest accuracy the current through the lamp is kept at or near the value corresponding to 1336°K and higher temperatures are measured by reducing the brightness of the image of the object to match that of the filament by means of a suitable screen such as a rotating sector or an absorption glass of known transmission. The temperature is then found from the following formula derived from Wien's Law:

$$\frac{1}{T} = \frac{1}{1336} + \lambda_e \cdot \frac{\log_{10} R}{6222},$$

in which R is the transmission of the absorption device and λ_e is the "mean effective wave-length" of a color filter in the pyrometer for the temperature interval 1336° to T. Values of λ_e can be obtained in some cases by the use of Table 2.

For practical purposes the pyrometer is ordinarily calibrated in the range 700° to 1400°C (occasionally to 1550°C) in terms of filament current. A satisfactory empirical relation between the current I through the lamp filament and temperature t°C is:

$I = a + bt + ct^2 + dt^3$. For tungsten lamps with short 3 mil filaments dI/dt varies from about 0.00015 ampere per degree at 700°C (I = 0.3) to 0.0003 ampere per degree at 1400° (I = 0.5). For measurements above 1400° an absorption glass of such type is employed that $A (= \lambda_0 \log_{10} R/6223)$ is a constant or varies slightly with temperature. If the spectral transmission, Tr, of the absorption device is of the form $\mathrm{Tr}_\lambda = e^{\frac{K}{\lambda}}$, A will be a constant and equal to K/c_2. For sector discs A = constant · λ_e.

TABLE 1

Temperatures extrapolated from 1336°K, using Wien's Law, compared with those obtained using Planck's Law. The values in this table were computed from the relation:

$$T_p = \frac{C_2}{\lambda \log_e\left[1 + e^{\frac{c_2}{\lambda T_w}}\right]}$$

taking λ = 0.65μ.

T_w	T_p	$T_w - T_p$	T_w	T_p	$T_w - T_p$
1336	1336 000		4500	4493	7
2000	1999 997	0 003	5000	4986	14
2500	2499 958	.042	6000	5959	41
3000	2999 74	.26	8000	7825	175
3500	3499 0	1 0	10 000	9550	450
4000	3997	3	∞	31 800	∞

TABLE 2

Effective wave-length and mean effective wave-length of optical pyrometer red glass filters. The effective wave-length λ_T is found from the formula

$$\frac{1}{\lambda_T} = a - \frac{b}{T}$$

Equation*	Corning H. T. red glasses				Visibility
	A	B	C	D	
a	1 5509	1 5415	1 5369	1 5319	
b	29.6	28 2	28 0	26 8	
Wave-length microns	Transmission				
0.615	0.000	0.000	0.000	0.000	0 442
.625	.085	.007	.000	.000	.323
.635	.520	.270	.141	.080	.220
.645	.730	.533	.389	.350	.141
.655	.798	.637	.508	.520	.084
.665	.815	.664	.541	580	.046
.675	823	.677	.557	.605	.024
.685	828	686	567	605	0126
.695	830	.689	572	.603	0061
.705	830	689	572	598	0031
.715	826	.682	564	590	00158
.725	824	.679	.559	.580	00078
.735	822	.676	.555	.572	00038
.745	820	.672	551	567	00018
.755	818	.669	.547	.550	00009
.765	815	.664	541	535	00003
.775	813	661	537	510	00000

* The constants a and b are given for four typical red glasses of the transmissions indicated. The change in effective wave-length with temperature of glass filter itself is closely 0 00009μ per deg C at ordinary room temperatures.

Angular apertures required in the telescope of the disappearing filament type of optical pyrometer for a balance between reflection and diffraction at the filament. Under such conditions disappearance of the filament is obtained without resorting to low magnification or very low resolving power.

TABLE 3.—TUNGSTEN FILAMENT OF CIRCULAR CROSS-SECTION

Exit aperture radians	Entrance aperture, radians	
	Filament diameter 0.04 to 0.06 mm	Filament diameter 0.1 mm
0.005	very low resolving power	
.01	0.04 and larger	0.04 and larger
02	.06 to .16	.055 to .07
.04	.08 to .13	
.06	non-disappearance	

TABLE 4.—BRIGHTNESS TEMPERATURE VERSUS TRUE TEMPERATURE FOR RED LIGHT(γ = 0.65μ)

Observed brightness temperature	True temperature						
	Platinum(1)	Iron(2)	Iron oxide(3)	Nickel oxide(4)	Copper(5)	Copper oxide(5)	Nichrome or chromel(6)
700	745		700	701			702
800	857		801	802			804
900	972		902	904		903	906
950					1083	958	
975					1181		
1000	1090		1004	1007	1156	1020	1010
1025					1193		
1050					1231	1087	
1100	1210	1183	1106	1110		1159	1116
1150						1233	
1200	1332	1296	1210	1215			1224
1300	1455	1410		1320			
1400		1525					
1500		1641					
1600		1758					
1700		1877					
1750		1936					

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(For a key to periodical see end of volume)

(1) Waidner and Burgess, *31a*, **3**: 163, 07. (2) Computed for an emissivity of 0.4, *cf.* Burgess, *32*, No. **91**: 17. (3) Burgess and Foote, *31a*, **12**: 83; 15 (4) Burgess and Foote, *31a*, **11**: 41; 15. (5) Burgess, *31a*, **6**: 111; 09. (6) Foote, Bureau of Standards, *0*. For data on C, Ta, W and other substances see sections on emissivity, color temperature, etc.

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LABORATORY METHODS FOR PRODUCING AND MAINTAINING CONSTANT TEMPERATURE

C. W. Kanolt, Olaf A. Hougen, Roland A. Ragatz and W. E. Forsythe

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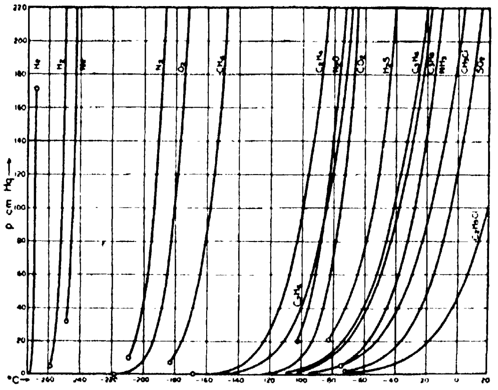
The successful application of the methods described in this section involves careful attention to the details of construction and operation of the auxiliary apparatus. For these details the reader is referred to the original literature.

1. TEMPERATURES BELOW 0°C

C. W. Kanolt

(*a*) *Bath Liquids Boiling at Constant Pressure.*—The temperature-pressure data for a number of suitable liquids are displayed graphically in Fig. 1. For further data concerning these liquids consult the index of I. C. T. Solid CO_2 mixed with a suitable low-freezing liquid may also be used. *Cf.* Sec. (*b*) *infra*, also (42).



Bath liquids for the maintenance of constant temperatures by boiling at a constant pressure.

(*b*) *Bath Liquids with Thermostatic Control.*—In some cases the liquid-solid mixture with proper thermal insulation may be conveniently used to automatically maintain the temperature of the invariant point (M.P. or eutectic). For general discussion of low temperature baths *v.* (16). The systems given below are arranged approximately in ascending order of their minimum working temperatures.

Abbreviations and Signs.—B. = "boils;" Cor. = "corrosiveness" or "corrosive;" E. = "eutectic composition;" Fl. = "flammable," hazardous, especially if cooled by means of liquid air. S. = "solidifies" or "solidification;" SS. = "suggested for use at its solidifying temperature;" η = "viscosity;" + = "high," − = "moderate or low," thus, η − = "moderate or low viscosity."

Below −150°.—1. *Petroleum distillate,* d_4^{15} 0.647: S. < −190° (3). *Ibid*, d_4^{15} = 0.651: S. < −190°. B. 33°. η + at −190° (22). 2. *Amylene, techn.:* S. < −188°. Fl. η > petrol ether, *q.v.* (18, 22). 3. *Propane:* S. at −187.8°. B. at −37°. Fl. 4. *Propylene:* S. at −185.2°. B. at −47°. Fl. May be used −190° to −160°. Moisture causes turbidity (25). 5. *Butane, techn.:* η − at −180°. Fl. Gas at ordinary temp. (24). 6. *Methyl chloride* 25% + *methyl ether* 75%, E.: S. at −154°. B. < −20°. Fl(4). 7. *Isopentane:* S. at −159.6°. B. at 28.0°. Fl. SS. (37).

From −150° to −125°.—8. *Pentane, techn.:* S. < −190° for some samples. B. *ca.* 25°. Fl. (16). η varies with diff. samples. *Cf.* (5, 7, 16, 17, 22, 24, 31). 9. *Petroleum ether:* one sample S. at −160° (7). Other samples used down to −130° (16); −135° (5); −150° (15, 30); −160° (25). Fl. 9a. *Chloroform* 18% + *trans-dichloroethylene* 13% + *trichloroethylene* 20% + *ethyl bromide* 41% + *ethyl chloride* 8%: S < −150°. Non-Fl. η_{-140} 0.71 poises, η_{-150} 6.3 poises (21). 10. *Chloroform* 15% + *methylene chloride* 25% + *trans-dichloroethylene* 11% + *trichloroethylene* 16% + *ethyl bromide* 33%: S. *ca.* −150°. Non-Fl. η_{-140} = 0.85 poises, η_{-150} = 15 poises (21). 11. *Ethyl chloride:* S. at −138.7°. B. 12.2°. Fl. η − at −138.7° (21). Cor. − (20, 19). Non-Fl. by adding methyl bromide (13). 12. *Chloroform* 20% + *trans-dichloroethylene* 14% + *trichloroethylene* 21% + *ethyl bromide* 45%. E.: S. at −139°. Non-Fl. η_{-130} = 0.29 poises; η_{-140} = 0.81 poises (21). 13. *Methyl ether:* S. at −138.5°. B. at −23.7°. Fl. 14. *n-Pentane:* S. at −130.8°. Fl. Very volatile. 15. *Ethyl ether* 75 vol. % + *toluene* 25 vol. %: S. *ca.* −130° (7). 16. *Methylcyclohexane:* S. at −126.3.° Fl. SS. (37). 17. *Petroleum distillate,* d_4^{15} 0.713: pasty *ca.* −125°. S. *ca.* −147° (6).

From −125° to −100°.—18. *Chloroform* 23% + *ether* 77%, E.: S. at −121.7° (35). 19. *Ethyl bromide:* S. at −119°. Non-Fl. Becomes Cor under action of light (10). η_{-119} = 0.053 poises (21). 20. *Ethyl ether:* S. at −116.3° and (metastable) at −123.3°. Fl. SS. (37). 21. *Carbon disulfide:* S. at −111.6°. Fl. toxic. SS. (37). 22. *Chloroform* 27% + *methylene chloride* 60% + *carbon tetrachloride* 13%. E.: S. at −111°. Non-Fl. η − at − 111° (21).

From −100° to −90°.—23. *Chloroform* 31% + *trichloroethylene* 69%. E.: S. at −100°. Non-Fl. η − at −100° (21). 24. *Chloroform* 71% + *ether* 29%. E.: S. at −97.4° (35). 25. *Methylene chloride:* S. at −97°. Volatile but non-Fl. η − at −97° (21). Addition of alcohol recommended to avoid formation of HCl in light (28). 26. *Chloroform* 79% + *ether* 21%. E.: S. at −95° (35). 27. *Toluene:* S. at −95.1°. Fl. η + at −80° (24). SS. (37). 28. *Acetone:* S. at −94.6°. Fl. $\eta_{-93.7}$ = 0.0205 poise (1). 29. *Methyl chloride:* S. at −91.5°. B. at −24.1°. Fl.−, and non-Fl. by adding methyl bromide (14). Cor. −.

From −90° to −80°.—30. *Ethyl alcohol:* S. at −114.1°. Fl. η + near −114° (18, 39). η increased by presence of H_2O (24). Used down to −80° (15, 16) and to −90° (24). 31. *Trichloroethylene:* S. at −86.4°. Non-Fl. η − at −86°. Cor. −, when pure but + when ox. by air. 32. *Ethyl acetate:* S. at −83.6°. Fl. SS. (37). 33. *Carbon tetrachloride* 49% + *chloroform* 51%. E.: S. at −81°. Non-Fl. η- at −81° (21). 34. *trans-Dichloroethylene:* S. at −80.5°. Fl. (9), but less so than vol. hydrocarbons (21). Cor −.

From −80° to −50°.—35. *Ethyl ether 80% + ethyl alcohol 20%:* *Fl.* *Used down to −78°.* η < alcohol. *Less turbid from moisture than is ether* (25). 36. *H_2SO_4, 38% in H_2O, E.: S. at −75°.* η+ *at low temps.* Cor. (23). 37. *Chloroform: S. at −63.5°. Non-Fl.* η− *at −63°* (21). *Cor−. SS.* (37). *A small quantity of alcohol prevents decomposition.* 38. *$CaCl_2$ 29.8% in H_2O. E.: S. at −55°.* η+ *at −55°* (38). *Cor.+* (32, 41). *Cor. diminished by addition of K_2CrO_4* (27).

From −50° to −25°.—39. *Gasolene + CCl_4:* Depending upon the density of the gasolene the following %'s of CCl_4 should be used to reduce Fl. 0.765, 30%; 0.725, 45%; 0.700, 60%; 0.680, 70% (2, 28). The 65% CCl_4 may be used at −50°. Flash pt. *ca.* 50°. Cor- (8). 40. *Chlorobenzene:* S. at −45.2°. Fl. SS. (37). 41. *NaCNS* 500 g per l H_2O, E.: S. at *ca.* −33°. Cor. < NaCl or $CaCl_2$ (36). 42. *Ethyl alcohol* 25% + *glycerine* 25% + *water* 50%: Used to −30° (40).

From −25° to 0°.—43. *Carbon tetrachloride:* S. at −22.9°. Non-Fl. η− at −23° (21). Cor−. SS. (37). 44. *NaCl* 22.4% in water, E.: S. at −21.2°. η−. Cor.

DISTILLATES FROM GALICIAN PETROLEUM(11)

Fractionation temp	24°–40°	40°–60°	60°–80°	80°–100°	100°–120°
d_4^{15} ..	0.6324	0.6593	0.7005	0.7351	0.7495
S. at	−203°	−198°	−185°	−170°	−151°
Fractionation temp.	**120°–140°**	**140°–160°**	**160°–180°**	**180°–200°**	**200°–220°**
d_4^{15}	0.7625	0.7738	0.7872	0.7962	0.8072
S. at	−139°	−127°	−112°	−104°	−93°

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(1) Archibald and Ure, *4*, **125**: 726, 24. (2) Associated Factory Mutual Fire Insurance Cos., Quart. Nat. Fire Protect. Assoc. **11**: 173, 17. (3) Baudin, *34*, **133**: 1207, 01. (4) Baume, *42*, **12**: 216, 14. (5) Beckmann and Waentig, *93*, **67**: 17, 10. (6) Cabot, *54*, **26**: 813, 07. (7) Cardoso, *42*, **13**: 312; 16. (8) Cragoe, McKelvy and O'Connor, *31A*, **18**: 707; 23. (9) Fabre, *42*, **21**: 268, 20.

(10) Fischer, Die neueren Arzneimittel, 6th ed., p. 74. (11) Formánek, Knop and Korber, *136*, **41**: 731, 17. (12) Hammerl, *75*, **78**: 59; 78. (13) Henning, U. S. Pat. 1,393,124, Brit. Pat. 158,494, 20. (14) Henning, U. S. Pat. 1,386,497; Canadian Pat. 213,825. (15) Henning, *243*, **33**: 33; 13. (16) Henning, *B62*, p. 261. (17) Hoffmann and Rothe, *243*, **27**: 265; 07. (18) Holborn and Wien, *8*, **59**: 213, 96. (19) Jenkin, *83*, **18**: 197; 22.

(20) Jenkin and Shorthose, *115*, **116**: 761, 23. *246*, **66**: 317, 24. (21) Kanolt, Bur. Stands., *O*. (22) Kohlrausch, *8*, **60**: 463; 97. (23) Pickering, *4*, **57**: 331; 90. (24) Loomis and Walters, Bur. Mines, *O*. (25) Maass and Wright, *1*, **43**: 1098, 21. (26) Meyerhoffer and Saunders, *7*, **31**: 381; 99. (27) Pedersen, U. S. Pat. 1,405,320. (28) Remington and Wood, U. S. Dispensatory, 20th ed., 18. (29) Roozeboom, *7*, **4**: 42; 99.

(30) Rothe, *243*, **22**: 14, 33; 02. (31) Rothe, *243*, **22**: 192, 02. (32) Rudnick, *46*, **11**: 668, 19. (33) Ruff and Fischer, *25*, **36**: 421; 03. (34) Saposhnikov, *245*, **6**: 381. (35) Smits and Berckmans, *64P*, **21**: 401; 19. (36) Sperr, U. S. Pat. 1,173,327. (37) Timmermans, Van der Horst and Onnes, *34*, **174**: 365, 22. Timmermans, *28*, **32**: 95, 23. (38) Tucker, *67*, **25**: 111, 13. (39) Wahl, *5*, **87**: 371, 12.

(40) Walton and Judd, *50*, **18**: 717, 14. (41) Zimmerman, *244*, **9**: 307, 21. (42) Thiele and Schulte, *7*, **96**: 312, 20.

LABORATORY METHODS FOR THE PRODUCTION COLD

C. W. KANOLT

(a) Liquids for Cooling by Vaporization into the Atmosp

The liquid may be sprayed onto the object to be cooled (2, 3, it may be vaporized by a current of air passed through it, formi a bath in which the object to be cooled is immersed (5); it may vaporized from a porous vessel (1); or in other ways. The tem peratures obtainable from the liquids are approximately in th order of their boiling points given below, but are much lower. Gases with critical temperatures above 20° are not included.

The data given below are, in the order given; boiling point, name of liquid, remarks, and literature.

Remarks: 1. Harmless. 2. Harmful. 3. Flammable. 4. Non-flammable. 5. Anaesthetic.

100°, *Water* (1, 4). 61.2°, *Chloroform* (4, 5). 46.2°, *Carbon disulphide* (2, 3). 40°, *Methylene chloride* (4, 5). 38.4°, *Ethyl bromide* (4, 5). 35°–39°, *Amylene, techn.* (3, 5). 34.6°, *Ethyl ether* (3, 5) produces −15° to −20° (2, 5). 13.1°, *Ethyl chloride* (3, 5) produces −35° (2). 0°—70°, *Volatile petroleum distillates* (1, 3). −10.0°, *Sulfur dioxide* (2, 4). −24.1°, *Methyl chloride* (3, 5) produces −55° to −60° (1, 2). −33.4°, *Ammonia* (2, 3). *Carbon dioxide* (1, 4). (The liquid can not exist at atmospheric pressure. Solid can be obtained by the release of liquid from pressure. Sublimation temperature −78.5°. Used mixed with a liquid (6), produces −112° to −115° (1). −89.8°, *Nitrous oxide* (4, 5).

LITERATURE

(For a key to the periodicals see end of volume)

(1) d'Arsonval, *34*, **133**: 980; 01. (2) Braun, Die Lokalanasthesie, Chapt. 4. (3) Kanolt, *48*, **9**: 416; 21. (4) Krause, *B61*, **6**: 635; 19. (5) Lawrence, *247*, No. **18**: 10; 16. (6) Thiele and Schulte, *7*, **96**: 312; 20.

(b) Freezing Mixtures

To absorb the largest amount of heat, an aqueous freezing mixture should be made with ice, rather than with water, and the other substance used should be cooled to 0°, or as low as possible, before mixing with the ice. To absorb at a given temperature the maximum amount of heat per unit mass of mixture, the proportions of ice and the other cooling agent should be those of a solution, the freezing point of which is the required temperature (8). The eutectic (cryohydric) temperature is the lowest attainable, if the ingredients are precooled sufficiently. Most, if not all, salts when mixed at room temperature with ice, produce sufficient cooling to reach this temperature.

For more extensive information than given here relative to the freezing points of solutions, together with the literature references, see the separate tables of freezing points.

The following mixtures are among the most useful:

(*a*) Sodium chloride with ice for temperatures down to −21.2°.

(*b*) Hydrated calcium chloride, $CaCl_2.6H_2O$, with ice, for temperatures down to −55°.

Aqueous solutions of sulfuric acid or hydrochloric acid with ice have an advantage over salts with ice in avoiding the delay incident to the solution of the salt.

Substances	Composition of mixture (% anhydrous salt, unless otherwise stated). E = eutectic composition	Freezing point of solution	Initial condition of freezing mixture	Lowest attained temperature recorded	Heat absorbed at temperature of mixing, cal per g of mixture	Heat absorbed (at freezing or saturation point of solution) from objects to be cooled, cal. per g of mixture. The * values are heats of fusion of the eutectic, r. (8)
NaCl—H_2O (4, 12)	22.4 (E for NaCl 2H_2O)	−21.2°				56.4*
	23.1 (E for NaCl)	−22.4°				
	24.8		salt and ice at −1°	−21.3°		
			with ice	−21°		
$NaNO_3$—H_2O (12, 13)	33.3		salt and ice at −1°	−17.75°		
	37 E	−18.5°				57.5*
	42.9		water and salt 13.2°	−5.3°		
$Na_2CO_3.10H_2O$—H_2O (12)	5.93E	2.1°				77.2*
	16.7		salt and ice at −1°	2.0°		
Na_2SO_4 10H_2O—H_2O	3.8E	−1.2°				80.1*
$Na_2S_2O_3.5H_2O$—H_2O (13)	30.0E	−11°				
	52.4		water and salt 10.7°	8.0°		
$NaOOCCH_3.H_2O$—H_2O (13)	45.9		water and salt 10.7°	4.7°		
KCl—H_2O (12)	19.3	−9.0				71.2*
	23.1		salt −1° ice 0°	10.9°		
KNO_3—H_2O (12)	11.2E	3.0°				80.7*
	11.5		salt and ice at −1°	2.85°		
K_2SO_4—H_2O (12)	6.54E	−1.55°				
	9.1		salt and ice at −1°	1.9°		
KSCN—H_2O (13)	60.0		water and salt 10.8°	23.7°		
NH_4Cl—H_2O (12)	18.7E	15.8°				75.0*
	20.0		salt and ice at 1°	15.4°		
NH_4NO_3—H_2O (12, 13, 15)	16.6	−6°	water and salt 0°	14.0°	12.2	2.6
			ice and salt 0°		78.8	73.6
	31.0		ice and salt at 1°	16.75°		
	31.2	12°	water and salt 0°	−26.0°	19.7	6.8
			ice and salt 0°		71.6	65.6
	37.5		water and salt 13.6°	13.6°		
	41.2	17.4°				68.4*
	43.3E	−17.5°	water and salt 0°	33.9°	21.3	8.2
			ice and salt 0°		69.5	57.1
	46.8	−12°	water and salt 0°	36.4°	25.5	13.6
			water and salt 20°			3.1
			ice and salt 0°		68.1	59.8
	50.3	−6° Salt separates	water and salt 0°	39.3°	26.5	19.0
			water and salt 20°			8.9
			ice and salt 0°		66.2	62.1
	54.1	0°	water and salt 0°	12.2°	27.6	24.3
			water and salt 20°			14.5
			ice and salt 0°		64.4	64.4
	57.1	5°	water and salt 0°	−41.7°	28.1	28.4
			water and salt 20°			18.8
NH_4SCN—H_2O (13)	57.1		water and salt at 13.2°	18.0°		
Ca_2Cl_26HO—H_2O (6)	% of hydrated salt 16.9	−4.0°	ice and salt 0°		69.9	66.2

Substances	Composition of mixture (% anhydrous salt, unless otherwise stated) E = eutectic composition	Freezing point of solution	Initial condition of freezing mixture	Lowest attained temperature recorded	Heat absorbed at temperature of mixing, cal. per g of mixture	Heat absorbed (at freezing or saturation point of solution) from objects to be cooled, cal. per g of mixture. The * values are heats of fusion of the eutectic, v. (5)
$CaCl_2 6H_2O$—H_2O (6) — *Continued*	26.8	−8.1°	ice and salt 0°		63.8	57.3
	34.6	−12.4°	ice and salt 0°		59.3	50.2
	45.7	−22.7°	ice and salt 0°		53.0	38.4
	54.9	−39.0°	ice and salt 0°		48.0	26.0
	58.8E	−54.9°	ice and salt 0°		45.8	17.7
	63.7	−33.3° Salt separates	ice and salt 0°		43.7	27.9
			water and salt 0°		14.4	none
	67.1	19.7°	ice and salt 0°		41.9	33.2
			water and salt 0°		15.4	6.7
	69.0	−14.1°	ice and salt 0°		41.0	35.0
			water and salt 0°		16.0	10.1
			water and salt 20°		none	1.5
	74.1	0°	ice and salt 0°		38.7	38.7
			water and salt 0°		17.7	17.7
			water and salt 20°		none	10.2
	77.5	7.6°	water and salt 0°		19.0	21.6
			water and salt 20°		none	14.7
$MgSO_4 12H_2O$—H_2O(5)	% anhyd. salt 19.0	−3.9°			58.2	
$CuSO_4 5H_2O$—H_2O(15)	11.9	−1.6°			60.0	
$ZnSO_4 7H_2O$—H_2O(5)	27.2	−6.55°			50.9	
$FeSO_4 7H_2O$—H_2O(5)	13.0	−1.8°			67.2	
66.19% H_2SO_4—H_2O (11)	% of 66.19% H_2SO_4 7.1		ice and acid at 0°	−16°	−2.1°†	68.6
	11.2		ice and acid at 0°	−20°	−3.1°†	62.0
	17.2		ice and acid at 0°	−24°	−5.5°†	52.9
	23.9		ice and acid at 0°	−28°	−9.5°†	43.0
	33.6		ice and acid at 0°	−32°	−16.5°†	24.5
	44.2		ice and acid at 0°	−36°	−30.2°†	7.5
	47.7		ice and acid at 0°	−37°	−37°†	0
HCl—H_2O	% HCl 24.8E	−86°				
$Na_2SO_4 10H_2O$—36.09% HCl (14)	% of $Na_2SO_4 10H_2O$ 21.05		0°		6.09	
	30.33		0°		9.17	
	36.59		0°		11.15	
	37.69		21.2°	−8.1°		
	42.37		0°		13.15	
	50.22		21.6°	−12.2°		
	62.67		15°			21.2 at 0° 12.0 at −15°
	62.96		21.6°	−15.3°		
	63.88		0°		28.89	
	74.64		15°			30.6 at 0° 19.1 at −15°
	74.68		0°		30.85	
	75.30		21.5°	−14.8°		
	78.90		0°		27.43	
	86.63		15°			24.5 at 0° 13.4 at −15°
	86.72		0°		19.44	
	88.53		20.1°	−15.6°		

† Temperature when all ice is melted

Substances	Composition of mixture (% anhydrous salt, unless otherwise stated). E = eutectic composition	Freezing point of solution	Initial condition of freezing mixture	Lowest attained temperature recorded	Heat absorbed at temperature of mixing, cal per g of mixture	Heat absorbed (at freezing or saturation point of solution) from objects to be cooled, cal. per g of mixture. The * values are heats of fusion of the eutectic, v (5)
$Na_2SO_4.10H_2O$—30 13% HCl (14)	% of Na_2SO_4 $10H_2O$ 46.04		19 7°	−11 8°		
	49.74		19 7°	−11 8°		
	63.46		19 7°	−14.4°		
	65.23		20 4°	−15 0°		
	75 43		20.0°	−14 8°		
	82 54		19 9°	−17.2°		
	86 31		20 0°	−12.6°		
	89 88		20 1°	ca 0°		
Na_2SO_4 $10H_2O$—24 47% HCl (14)	% of Na_2SO_4 $10H_2O$ 35.54		0°		12 07	
	38.16		19.9°	8 2°		
	50 42		19 8°	10 0°		
	62 22		0°		26.84	
	63 86		20 5°	−12 0°		
	67 57		0°		27.18	
	71.46		0°		25 72	
	75 36		21.0°	−11 8°		
	78 40		0°		20 21	
C_2H_5OH—H_2O (10)	% alc 50	−37°	alc at 2° ice at 0°	−24 2°		
			alc at 1 5° ice at −1°	−29 4°		
	51 3	−38°	alc at 4° ice at 0°	ca −30°		
CS_2—$(CH_3)_2CO$	A temperature of −43 5° in a volume of 20 cc was maintained by mixing 100 cc of carbon disulfide and 70 cc of acetone per hour, using a heat interchanger (3).					

Salts	Temperature produced by mixing salts with water	Lit.	Reduction of temperature produced by water with an equal weight of a salt or of a mixture of salts in equal parts (7)
NH_4Cl			14°
NaCl			4°
KCl			12°
NH_4NO_3			25°
$NaNO_3$			9 5°
KNO_3			10°
NH_4SO_4			8°
$Na_2SO_4.10H_2O$			7 5°
K_2SO_4			4 5°
NH_4Cl—KNO_3	−18 2°	(9)	20°
NH_4Cl—$NaNO_3$	−31 5°	(9)	17°
NH_4Cl—NH_4NO_3			22°
NH_4Cl—$Na_2SO_4.10H_2O$	−17 6°	(9)	19°
NH_4Cl—K_2SO_4	−18 0°	(9)	
NaCl—KNO_3			10°
$NaCl.2H_2O$—KNO_3	−24 9°	(9)	
KCl—$NaNO_3$			11°
KCl—NH_4NO_3			20°
NH_4NO_3—KNO_3			22°
NH_4NO_3—$Na_2SO_4.10H_2O$	−19.5°	(9)	26°
Na_2NO_3—$NaSO_4.10H_2O$			10°

Salts	Temperature produced by mixing salts with water	Lit.	Reduction of temperature produced by water with an equal weight of a salt or of a mixture of salts in equal parts (7)
$NaNO_3$—KCNS	−37 4°	(1)	
KNO_3—NH_4CNS	−28.2°	(1)	
NH_4Cl—NH_4NO_3—KNO_3	−22 6°	(9)	
NH_4Cl—NH_4NO_3—$NaNO_3$	−30.1°	(9)	
NH_4Cl—$Na_2SO_4.10H_2O$—KNO_3			17°–23°
NH_4Cl—$(NH_4)_2SO_4$—K_2SO_4	−15.2°	(9)	
NH_4Cl $(NH_4)_2SO_4$—$Na_2SO_4.10H_2O$	−19.9°	(9)	
$NaCl$ $2H_2O$ —$NaNO_3$—KNO_3	−24 6°	(9)	
KCl—KNO_3—K_2SO_4	−11.55°	(2)	
NH_4NO_3—KNO_3—$NaNO_3$			16°–27°
NH_4NO_3—KNO_3—$Na_2SO_4.10H_2O$			17°–26°
NH_4NO_3—$(NH_4)_2SO_4$—$Na_2SO_4.10H_2O$	−19.5°	(9)	

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(For a key to the periodicals see end of volume)

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2. TEMPERATURES ABOVE 0°C

Olaf A. Hougen and Roland A. Ragatz

(*a*) *Bath Liquids or Vapor Baths with Boiling under Constant External Pressure.* For heterogeneous systems and solutions *v.* (**13**). For fire hazards on certain of these liquids *v.* p. 61.

For a more extensive series of liquids arranged in order of boiling points *v.* p. 310

Substance	Boiling point At 760 mm	Boiling point At 100 mm	Actual range used	Lit.
Ethyl chloride	12.2°	-31.3°	13° to 30°	(**23**)
Ethyl ether	34.5°	-12.1°		(**2, 11, 13**)
Carbon disulfide	46.3°	4.8°	46° to -26°	(**3, 11, 13, 26, 27, 31, 41**)
Acetone	56.1°	7.5°		(**13, 21**)
Chloroform	61.2°	9.7°		(**11, 21**)
Methyl alcohol	64.5°	20.62°	65° to 19°	(**2, 10, 11, 13, 21, 30**)
Ethyl alcohol	78.5°	34.4°	78° to 40°	(**2, 10, 11, 13, 21, 31**)
Benzene	79.8°	25.8°	81° to 40°	(**10, 11, 13, 39**)
Water	100°	51.7°	145° to 25°	(**2, 3, 9, 11, 13, 16, 18, 26, 27, 29, 30, 32, 43**)
Toluene	110.5°	51.8°	130° to 70°	(**10, 13, 21, 29, 32, 39, 45**)
Chlorobenzene	132.1°	70.3°	132° to 70°	(**31, 39**)
m-Xylene	139.0°	77.8°	140° to 70°	(**10, 21, 28, 32, 39, 45**)
Isoamyl acetate	142.5°		141° to 119°	(**30, 45**)
Bromobenzene	156.2°	90.7°	160° to 120°	(**28, 31**)
Aniline	184.4°	119.4°	184° to 150°	(**27, 31, 32, 39, 42, 45**)
Ethyl benzoate	213.2°	142°		(**21, 27, 45**)
Naphthalene	217.9°	144.3°		(**28, 39**)
Methyl salicylate	223.3°	151°	225° to 175°	(**31**)
Quinoline	237.7°	166.7°	238° to 170°	(**15, 21, 39, 45**)
Isoamyl benzoate	262°			(**21, 28, 45**)
α-Bromonaphthalene	281.1°	198.8°	281° to 215°	(**28, 31**)
Diphenylamine	302.0°	221°		(**5, 15, 28, 39, 45**)
Benzophenone	305.4°	224°	306° to 257°	(**28, 39**)
Mercury	356.9°	261.5°	Various ranges	(**2, 5, 31, 39**)
Sulfur	444.6°	330.7°	Various ranges	(**2, 5, 6, 39**)
Phosphorus pentasulfide	52°			(**5**)
Zinc	907°	758°		(**2**)

(*b*) *Solid-liquid Non-variant Points* 1. Ice-water, *v.* (**11, 24, 29, 46**). 2. Transformation temperatures of crystalline hydrates.

Salt	Hydration temperature °C	Lit.
Sodium chromate	19.71	(**12, 33**)
Sodium sulfate	32.383	(**11, 12, 32, 33, 34, 35**)
Sodium carbonate	35.3	(**12, 33**)
Sodium thiosulfate	48.0	(**12, 33**)
Sodium bromide	50.8	(**12, 33**)
Manganese chloride	57.8	(**12, 33**)
Trisodium phosphate	73.4	(**12, 33**)
Barium hydroxide	78.0	(**12, 33**)

(*c*) *Bath Liquids with Thermostatic Control*

Liquid	Useful range	Lit.
Water	0° to 90°	(**17, 18, 21, 40**)
Mineral oils	To 20° below the flash point	(**5, 19, 22, 37, 38, 40**)
Paraffin	M.P. to 300°	(**5, 27, 29, 40**)
10 parts cottonseed oil, 1 part beeswax	M.P. to 300°	(**7**)
Hydrogenated sesame oil	60° to 300°	(**36**)
Hydrogenated cottonseed oil	60° to 285°	(**36**)

Fused salts	Melting point	Lit.
$NaNO_3$ (45%), KNO_3 (55%)	218°	(**8, 14, 21, 32, 44**)
$NaNO_3$ (55%), $NaNO_2$ (45%)	221°	(**44**)
KNO_3	337°	(**1**)
NaCl (28%), $CaCl_2$ (72%)	500°	(**44**)
NaCl (50%), K_2CO_3 (50%)	560°	(**44**)
Na_2CO_3 (50%), KCl (50%)	560°	(**44**)
$CaCl_2$ (50%), $BaCl_2$ (50%)	600°	(**44**)
NaCl (35%), Na_2CO_3 (65%)	620°	(**44**)
NaCl (22%), $BaCl_2$ (78%)	654°	(**44**)
NaCl (44%), KCl (56%)	663°	(**44**)

Molten metals	Useful range	Lit.
Lead	327° to 700°	(**4, 5, 6, 29**)
Lead (30%), Tin (70%)	Above 183°	(**14**)
Lead (50%), Tin (50%)		(**5**)

Other liquids	Useful range	Lit.
Naphthalene	80° to 217°	(**20, 21, 25**)
Benzophenone	49° to 305°	(**20, 21, 25**)
Sulfur	113° to 444°	(**20, 25**)

(*d*) *Metal Blocks.*—Aluminum and copper blocks have been used up to 600°, with a uniformity of temperature of 1° (**39**).

(*e*) *Gas Baths and Furnaces.*—For temperatures above 900°, an electrically heated gas bath is usually employed, although for the higher temperatures a bath material is not essential since heat transfer takes place primarily by radiation. For lower temperatures, heat transfer and temperature uniformity are promoted by packing with a granular non-oxidizing metal.

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MAXIMUM TEMPERATURES THAT CAN BE REACHED AND MAINTAINED FOR OBSERVATIONAL PURPOSES BY VARIOUS MEANS

W. E. Forsythe

	Maximum temperature, °C
Electric furnaces operating in open air	
Iron tube or iron wire wound furnace	500
Nicrome wound refractory tube	800
Platinum wound refractory tube—double winding (2)......	1530
Iridium tube	1900
Carbon resistor furnace	2200
Carbon arc furnace	3200
Electric furnaces operating in vacuo or inert gas	
Tungsten wound refractory tube limited by refractory tube	2000
Carbon tube furnace	2700
Tungsten tube furnace (in vacuo)	2200
Tungsten tube furnace (in inert gas)	2800
Gas-fired furnaces	
Special makes of furnaces(5) with flames entering the furnace in tangential direction so as to give a good distribution of the heat, if gas and air are well mixed, can be raised up to about..............................	1700
The regenerative furnaces, such as are used in open hearth steel furnaces, can be heated up to about the same temperature of	1700
Special furnaces and methods	
High-frequency induction furnace. Limited only by melting point of refractory or metal used	
Filament in vacuum or inert gas limited only by rate of vaporization or melting point of filament used	
Arc under pressure	
Carbon (4)	5790
Tungsten (3)	4785
Exploding fine wires by discharging a condenser charged to high voltage through them gives a temperature up to about (1)	19700

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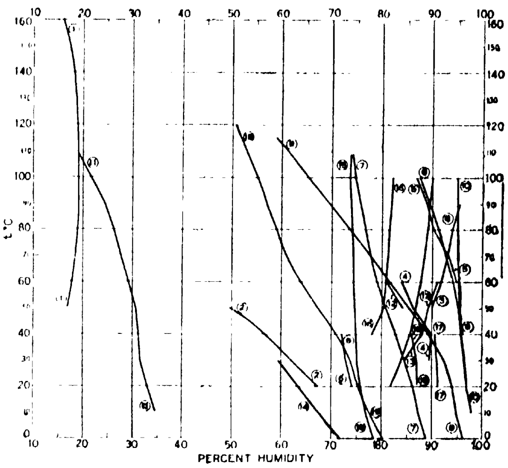
LABORATORY METHODS FOR MAINTAINING CONSTANT HUMIDITY

Hugh M. Spencer

A saturated aqueous solution in contact with an excess of a definite solid phase at a given temperature will maintain a constant humidity within any enclosed space around it. By properly selecting the salt to be used almost any desired degree of humidity can be secured and controlled in this way. A number of salts suitable for this purpose are displayed in the accompanying chart and tables, together with the % humidity prevailing above their saturated solutions at different temperatures. To convert "% humidity" into "aqueous tension" multiply it by the vapor pressure of pure water at the same temperature.

SOLID PHASE

1. $CaCl_2.2H_2O$ (19)
2. $CoCl_2.6H_2O$ (8).
3. $CoSO_4.6H_2O$ (7).
4. $CuCl_2.2H_2O$ (8, 13, 22).
5. $CuSO_4.5H_2O$ (11, 16).
6. $K_2C_4H_4O_6.\frac{1}{2}H_2O$ (4).
7. KCl (4, 5, 9, 18, 21).
8. $KClO_3$ (5, 11, 16).
9. KNO_3 (4, 5, 9, 16).
10. K_2SO_4 (4, 5, 15, 20).
11. $MgCl_2.6H_2O$ (8, 13)
12. $MgSO_4.6H_2O$ (7).
13. $MnSO_4.H_2O$ (7).
14. NH_4NO_3 (9, 18).
15. NaCl (4, 5, 18, 21).
16. $Na_2CO_3.H_2O$ (10, 22)
17. $Na_2C_4H_4O_6.2H_2O$ (14)
18. $NaKC_4H_4O_6.4H_2O$ (14).
19. $NaNO_3$ (4, 5, 9, 18, 21).
20. Na_2SO_4 (4, 16, 24, 26)



Solid phases	t, °C	% humidity	Lit.
$BaCl_2.2H_2O$	24.5	88	(15)
$CaCl_2.6H_2O$ ...	5	39.8	(20)
	10	38	(19)
	18.5	35	(15)
	20.0	32.3	(19)
	24.5	31	(15)
$Ca(NO_3)_2.4H_2O$.............	18.5	56	(15)
	24.5	51	(15)
$CaSO_4.5H_2O$	20	98	(15)
CrO_3...	20	35	(15)
$H_2C_2O_4.2H_2O$	20	76	(15)
$H_3PO_4.\frac{1}{2}H_2O$	24.5	9	(15)
$KC_2H_3O_2$	20	20	(15)
	168	13	(11)
KBr....................	20	84	(15)
	100	69.2	(5)

Solid phases	t, °C	% humidity	Lit.
$K_2CO_3.2H_2O$	18.5	44	(15)
	24.5	43	(15)
$KCNS$	20	47	(15)
K_2CrO_4	20	88	(15)
KF	100.0	22.9	(5)
K_2HPO_4	20	92	(15)
$KHSO_4$	20	86	(15)
KI	100.0	56.2	(5)
KNO_2	20	45	(15)
$LiCl.H_2O$	20	15	(15)
$Mg(C_2H_3O_2)_2.4H_2O$	20	65	(15)
$Mg(NO_3)_2.6H_2O$	18.5	56	(15)
	24.5	52	(15)
NH_4Cl	20.0	79.2	(9)
	25.0	79.3	(9)
	30.0	79.5	(9)
NH_4Cl and KNO_3	20.0	72.6	(9)
	25.0	71.2	(9)
	30.0	68.6	(9)
$NH_4H_2PO_4$	20.0	93.1	(9)
	25.0	93.0	(9)
	30.0	92.9	(9)
$(NH_4)_2SO_4$	20.0	81.0	(9)
	25.0	81.1	(9)
	30.0	81.1	(9)
	108.2	75	(11)
$NaBr$	100.0	22.9	(5)
$NaBr.2H_2O$	20	58	(15)
$NaBrO_3$	20	92	(15)
$NaCl$ and $KClO_3$	16.39	36.58	(6)
$NaCl$ and KNO_3	16.39	32.57	(6)
$NaCl$, KNO_3 and $NaNO_3$	16.39	30.49	(6)
$NaC_2H_3O_2.3H_2O$	20	76	(15)
$Na_2CO_3.10H_2O$	18.5	92	(15)
	24.5	87	(15)
$NaClO_3$	20	75	(15)
	100.0	54	(5)
$Na_2Cr_2O_7.2H_2O$	20	52	(15)
NaF	100.0	96.6	(5)
$Na_2HPO_4.12H_2O$	20	95	(15)
$NaHSO_4.H_2O$	20	52	(15)
NaI	100.0	50.4	(5)
$NaNO_2$	20	66	(15)
$Na_2SO_3.7H_2O$	20	95	(15)
$Na_2S_2O_3.5H_2O$	20	78	(15)
$Na_2SO_4.10H_2O$	20	93	(15)
$Pb(NO_3)_2$	20	98	(15)
	103.5	88.4	(11)
$TlCl$	100.097	99.7	(4)
$TlNO_3$	100.317	98.7	(4)
Tl_2SO_4	104.7	84.8	(4)
$ZnCl_2.1\frac{1}{2}H_2O$*	20	10	(15)
$Zn(NO_3)_2.6H_2O$	20	42	(15)
$ZnSO_4.7H_2O$	5	94.7	(20)
	20	90	(15)

* Unstable at this temperature.

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BAROMETRY AND MANOMETRY

H. H. KIMBALL

1. *Gravity Correction.*—The equivalent barometric, or other manometric, height (B_s) corresponding to standard gravity (g_s = 980.665 cm sec^{-2}) is related to the height (B_l) corresponding to local gravity (g_l) as shown by equation (1):

$$B_s = B_l\frac{g_l}{g_s} = B_l + C_g; \quad C_g = B_l\frac{g_l - g_s}{g_s} \tag{1}$$

When g_l and g_s are expressed in cm sec^{-2},

$$C_g = B_l\left[\frac{(g_l - g_s)(1.0197)}{1000}\right]$$

Any desired unit may be used for B_l; C_g and B_s are in the same unit as B_l. [For most barometric purposes, a sufficiently accurate correction (within ±0.01% of B_l) is obtained by the use of the approximate correction $C_g' = B_n\frac{g_l - g_s}{g_s}$, in which B_n is the usual barometric pressure at the station.]

Example: $B_l = 29.851$, $g_l = 978.053$ cm sec^{-2}. Then $(g_l - g_s) = -2.612$ cm sec^{-2}; $0.0197(g_l - g_s) = -0.0515$ cm sec^{-2}; $1000\,C_g = -2.663B_l = -79.49$. $\therefore B_s = 29.851 - 0.079 = 29.772$.

2. *Temperature Correction.*—The equation by which the equivalent barometric, or other manometric, height (B) at the standard temperature (t_m) can be computed from the nominal height (B') at the temperature t, is generally written in the form

$$B = B' + C_t; \quad C_t = B'\frac{l(t - t_s) - m(t - t_m)}{1 + m(t - t_m)} \tag{2}$$

where t_m = standard temperature of the manometric liquid, t_s = temperature at which the scale, after correction for errors of graduation, reads correctly, m = coefficient of cubical expansion of the manometric liquid, l = coefficient of linear expansion of the material on which the scale is engraved.

The value of m which is generally used for mercury, and which has been adopted by the International Meteorological Tables, is $m = 181.8 \times 10^{-6}$ per °C. For temperatures between 0°C and 30°C this value appears (5, 6, 8, 15, 17) to be correct within $\pm 0.1 \times 10^{-6}$ per °C. The value of l, for brass, which has been adopted by the International Meteorological Tables, is $l = 18.4 \times 10^{-6}$ per °C. The best determinations (1, 2, 11) of this coefficient for temperatures between 0° and 30° yield values varying from

17.5×10^{-6} per °C to 19.3×10^{-6} per °C, or by ± 5%. For glass scales the approximate value $l = 8.5 \times 10^{-6}$ per °C is usually satisfactory. (For silicate flint glasses (12) l varies from 7.88×10^{-6} per °C to 9.35×10^{-6} per °C; for crown glasses (13) it varies from 6.75×19^{-6} to 9.54×10^{-6} per °C.

For barometers with metric scales, the combined effect of an error of $\pm 0.1 \times 10^{-6}$ per °C in m and of $\pm 0.9 \times 10^{-6}$ per °C in l will cause an error in C_t of $\pm \frac{B't \times 10^{-6}}{1 + mt}$. For $t = 30$°C and $B' = 760$ mm, the error would be ±0.023 mm; while for $t = 10$°C, $B' = 100$ mm, it would be only ±0.001 mm. At ordinary room temperatures, the error so produced in C_t will be less for barometers graduated in inches than for one graduated in millimeters. (For barometers graduated in inches $t_s = 62$°F, $t_m = 32$°F).

TABLE 1.—TEMPERATURE CORRECTION (C_t) FOR MERCURIAL MANOMETERS AND BAROMETERS
$B = B' + C_t$; (B' = nominal height at t°; B = equivalent height for mercury at 0°C; B, B', and C_t are all in the same unit, which may be anything desired)

A. Brass scale correct at 62°F, inches, °F; $t_m = 32$°F, $t_s = 62$°F, $m = 181.8 \times 10^{-6}$ per °C, $l = 18.4 \times 10^{-6}$ per °C
(Applies directly to commercial barometers graduated in inches)

t(°F) \ B'	10	20	30	40	50	60	70	80	90
+12	+0.015	+0.030	+0.045	+0.061	+0.076	+0.091	+0.106	+0.121	+0.136
22	+0.006	+0.012	+0.018	+0.024	+0.030	+0.036	+0.042	+0.048	+0.054
32	−0.003	−0.006	−0.009	−0.012	−0.015	−0.018	−0.021	−0.024	−0.028
42	−0.012	−0.024	−0.036	−0.049	−0.061	−0.073	−0.085	−0.097	−0.109
52	−0.021	−0.042	−0.064	−0.085	−0.106	−0.127	−0.148	−0.169	−0.191
62	−0.030	−0.060	−0.091	−0.121	−0.151	−0.181	−0.211	−0.242	−0.272
72	−0.039	−0.078	−0.118	−0.157	−0.196	−0.235	−0.275	−0.314	−0.353
82	−0.048	−0.096	−0.145	−0.193	−0.241	−0.289	−0.338	−0.386	−0.434
92	−0.057	−0.114	−0.172	−0.229	−0.286	−0.343	−0.400	−0.458	−0.515

B. Brass scale correct at 0°C, millimeters, °C; $t_m = t_s = 0$°C, $m = 181.8 \times 10^{-6}$ per °C, $l = 18.4 \times 10^{-6}$ per °C

t(°C) \ B'	100	200	300	400	500	600	700	800	900
−10	+0.16	+0.33	+0.49	+0.65	+0.82	+0.98	+1.15	+1.31	+1.47
− 5	+0.08	+0.16	+0.25	+0.33	+0.41	+0.49	+0.57	+0.65	+0.74
0	0.00								
+ 5	−0.08	−0.16	−0.24	−0.33	−0.41	−0.49	−0.57	−0.65	−0.73
10	−0.16	−0.33	−0.49	−0.65	−0.82	−0.98	−1.14	−1.30	−1.47
15	−0.24	−0.49	−0.73	−0.98	−1.22	−1.47	−1.71	−1.96	−2.20
20	−0.33	−0.65	−0.98	−1.30	−1.63	−1.95	−2.28	−2.60	−2.93
25	−0.41	−0.81	−1.22	−1.63	−2.03	−2.44	−2.85	−3.25	−3.66
30	−0.49	−0.98	−1.46	−1.95	−2.44	−2.93	−3.41	−3.90	−4.39
35	−0.57	−1.14	−1.70	−2.27	−2.84	−3.41	−3.98	−4.55	−5.11
40	−0.65	−1.30	−1.95	−2.60	−3.24	−3.89	−4.54	−5.19	−5.84

C. Glass scale correct at 0°C, $t_m = t_s = 0$°C, $m = 181.8 \times 10^{-6}$ per °C, $l = 8.5 \times 10^{-6}$ per °C

t(°C) \ B'	100	200	300	400	500	600	700	800	900
−10	+0.17	+0.35	+0.52	+0.69	+0.87	+1.04	+1.22	+1.39	+1.56
− 5	+0.09	+0.17	+0.26	+0.35	+0.43	+0.52	+0.61	+0.69	+0.78
0	0.00								
+ 5	−0.09	−0.17	−0.26	−0.35	−0.43	−0.52	−0.61	−0.69	−0.78
10	−0.17	−0.35	−0.52	−0.69	−0.86	−1.04	−1.21	−1.38	−1.56
15	−0.26	−0.52	−0.78	−1.04	−1.30	−1.56	−1.81	−2.07	−2.33
20	−0.34	−0.69	−1.04	−1.38	−1.73	−2.07	−2.42	−2.76	−3.11
25	−0.43	−0.86	−1.29	−1.73	−2.16	−2.59	−3.02	−3.45	−3.88
30	−0.52	−1.03	−1.55	−2.07	−2.59	−3.10	−3.62	−4.14	−4.65
35	−0.60	−1.21	−1.81	−2.41	−3.01	−3.62	−4.22	−4.82	−5.42
40	−0.69	−1.38	−2.06	−2.75	−3.44	−4.13	−4.82	−5.51	−6.19

Example: Barometer graduated in inches, brass scale correct at 62°F; $B' = 29.564$ in., $t = 76.8$°F. From section A it is found that at 72°, C_t for $B' = 29.564$ is −0.1155, at 82° it is −0.1421; hence at 76.8°, $C_t = -0.1155 + \frac{4.8}{10}(-0.0266) = -0.1155 - 0.0128 = -0.128$. Hence $B = 29.564 - 0.128 = 29.436$ in.

3. *Capillary Corrections.*—The curvature of the surfaces of the manometric liquid introduces pressures directed towards the centers of curvature of the surfaces. For each surface, this pressure is

$$\gamma\left(\frac{1}{r_1} + \frac{1}{r_2}\right)\text{dynes cm}^{-2} = \frac{\gamma}{dg}\left(\frac{1}{r_1} + \frac{1}{r_2}\right)\text{cm of the manometric liquid.}$$

[γ = surface tension (in dynes cm^{-1}), d = density of the liquid (in g cm^{-3}), g is the acceleration of gravity (in cm sec^{-2}), and r_1 and r_2 are the principal radii of curvature (in cm) of the surface at the point considered.] At the vertex of the meniscus in a tube of circular section, $r_1 = r_2 = r$, and if the angle of contact of the liquid with the tube is either 0° or 180°, and if the tube is not too large, r is practically equal to the internal radius of the tube. If the liquid surface is in an annular space between coaxial, circular cylinders (as in the reservoir of a Fortin barometer), if the angle of contact is 0°, and if neither r_1 nor $(r_3 - r_2)$ is very great as compared with the capillary constant, (18), then $h' = \frac{2dhr_1}{(r_3 - r_2)^2}$, approximately; h' and h are the respective capillary pressures (in terms of unit column of the liquid) at the vertices of the surfaces in the annular space of width $(r_3 - r_2)$, and in a tube of radius r_1; and d is the depth of the annular meniscus

Laplace (12) has shown that, except for sign, the equations for a convex meniscus are the same as those for a concave one. Hence, this expression can probably be accepted as a first approximation to the value for h' for any liquid, provided that the angle of contact of the liquid with the solid is the same at all three surfaces, and that r_1 and $(r_3 - r_2)$ are not too great. In the case of the ordinary mercurial cistern barometers, $(r_3 - r_2)$ is quite large as compared with the capillary constant of mercury, and the angles of contact may not be the same at all three surfaces; for these reasons, no great confidence can be placed in the actual value of h', as so computed, for such barometers, but its order of magnitude will probably be correct.

TABLE 2.—CAPILLARY DEPRESSION OF THE APEX OF A MERCURIAL COLUMN IN A GLASS TUBE OF CIRCULAR SECTION*

Depression in millimeters

Radius of the tube, mm	Height of the meniscus, mm								
	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
1.0	2.46	4.40							
1.4	1.26	2.36	3.22						
1.8	0.75	1.41	2.02	2.48					
2.2	0.49	0.95	1.36	1.70	1.98				
2.6	0.34	0.66	0.96	1.22	1.44	1.61			
3.0	0.24	0.48	0.70	0.90	1.07	1.21	1.32		
3.5	0.17	0.34	0.49	0.64	0.76	0.87	0.96	1.04	
4.0	0.12	0.24	0.35	0.46	0.56	0.64	0.71	0.77	0.82
4.5	0.09	0.18	0.26	0.34	0.41	0.47	0.53	0.58	0.62
5.0	0.07	0.13	0.19	0.25	0.30	0.35	0.40	0.44	0.47
5.5	0.05	0.10	0.14	0.19	0.23	0.27	0.30	0.33	0.36
6.0	0.04	0.07	0.11	0.14	0.18	0.20	0.23	0.25	0.27
6.5	0.03	0.06	0.09	0.11	0.14	0.16	0.18	0.20	0.21
7.0	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.15	0.16

* From the Schleiermacher-Delcros (4, 9, 10) table, as revised by Süring (14). The values are about 5 % larger than those obtained from Bravais's (3) table, in which the arguments are the diameter of the tube, and the angle of incidence of the meniscus of the mercurial column with the walls of the tube.

Example: In a barometer cistern for which $r_2 = 6$ mm, $r_3 = 16$ mm, d was found to be 0.5 mm; the radius of the barometer tube was $r_1 = 5$ mm, and the height of the meniscus in it was 1.0 mm. From Table 2 it is found that the depression h, due to the meniscus in the 5 mm tube, is 0.30 mm; hence $h' = 0.015$ mm. That is, the pressure due to the annular surface is of the order of 0.02 mm; and the total depression of the column is $H = 0.30 - 0.02 = 0.28$ mm, subject to the uncertainty regarding the actual value of h'.

4. *Possible Residual-gas Error in Good Barometers.*—Under ordinary laboratory conditions, errors amounting to as much as 4.1 mm (0.163 in.) have been observed, and errors of 1.1 mm (0.043 in.) are not uncommon; but in most barometers, this error does not exceed 0.25 mm (0.010 in.) when the instrument is shipped by the manufacturer. Air may be introduced during shipment and by handling. The smaller the tube of the barometer, the more likely is the error to be large. The magnitude of the error varies with the temperature and with the volume of the space above the mercury column, as indicated by equation (3):

$$x = x_0 \frac{V_0}{V}[1 + 0.00367(t - t_0)] \qquad (3)$$

where x_0 and x are, respectively, the errors corresponding to the volume V_0 temperature t_0, and to the volume V temperature t; temperatures being expressed in °C.

5. *Conversion of Water Column at t°C to the Equivalent Water Column at 4°C.*—If h_t and h_4 are the equivalent true heights (corrected for scale errors of graduation and expansion, and for capillary pressures), and if d_t and d_4 are the respective densities (7, 16) then, if $\delta = (d_4 - d_t)/d_4$, $h_4 = h_t(1 - \delta)$.

TABLE 3.—VALUES OF 100δ

t (°C)	Units of t				
	0	2	4	6	8
tens					
0	0.013	0.003	0.000	0.003	0.012
1	0.027	0.048	0.073	0.103	0.138
2	0.177	0.221	0.268	0.320	0.375
3	0.435	0.497	0.563	0.633	0.706

Example.—$h_{25} = 67.53$ cm. At 25°, $100\delta = 0.294$. $\therefore \delta h_{25} = 0.199$, $h_4 = h_{25}(1 - \delta) = 67.53 - 0.20 = 67.33$ cm.

6. *Conversion of Water Column at 4°C to Equivalent Mercury Column at Standard Density* (13.5951 $g\ cm^{-3}$); *and the Reverse.*—If h_w and h_m are the equivalent true heights (corrected for the scale errors of graduation and expansion, and for all capillary effects) of the water and the mercury, respectively, $h_m = 0.073554h_w$.

TABLE 4.—EQUIVALENT COLUMNS OF WATER (h_w) AND OF MERCURY (h_m)

(Density of water = 0.999973 g cm^{-3}; of mercury = 13.5951 g cm^{-3})

h_w	h_m	h_w	h_m	h_m	h_w	h_m	h_w
100	7.3554	600	44.132	1	13.5955	6	81.573
200	14.7108	700	51.488	2	27.1909	7	95.168
300	22.0662	800	58.843	3	40.7864	8	108.764
400	29.4216	900	66.199	4	54.3818	9	122.359
500	36.7770	1000	73.554	5	67.9773	10	135.955

LITERATURE

(For a key to the periodicals see end of volume)

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PSYCHROMETRY; DENSITY OF MOIST AIR; CHANGE IN BAROMETRIC PRESSURE WITH ALTITUDE

F. W. J. WHIPPLE

B; B_h	Barometric pressure, in general; at h
C	Instrumental constant
d; d_h; d_0	Density of air, in general; at h; at T_0 and A_n
e; e'	Pressure of water vapor, present; when in equilibrium with water (or ice) at temperature t'
g; g_s	Acceleration of gravity, actual; standard value
h; H	Altitude above sea level, cm; meters
t; t'	Readings of dry bulb; of wet bulb
T; T_0; T'	Absolute temperatures in °C, general; of ice point, "virtual"
x	Ratio (mass of vapor)/(mass of dry air)

1. Psychrometry.—The pressure of the water vapor contained in the air is commonly deduced from the simultaneous readings of wet bulb and of dry bulb thermometers. The difference in these two readings depends upon the heat received by radiation as well as upon that furnished directly by the air. When the air flow is slow, the radiation is an important factor. In the Assmann psychrometer the bulb is surrounded by a double metal sheath; this largely eliminates radiation effects. It is important to secure adequate ventilation by the use of a thermometer with a bulb much smaller than the sheath. The standard bulb is 12 mm long and 4 mm in diameter. Alternatively, the thermometers may be "slung," *i.e.*, whirled on a suitable holder. In this case, direct radiation from sun or sky should be avoided as it affects the dry-bulb readings and therefore the psychometric difference.

The general formula for the computation of vapor pressure is

$$e' - e = CB(t - t') \times 10^{-4}$$

B, e, and e' are expressed in the same units, which may be anything desired. Within the order of accuracy of psychrometer observations, C is constant for a given velocity of the air-flow past the wet bulb. The relation of C to the air velocity has not been determined very precisely. The variation of C with temperature is negligible. If temperatures are expressed in °C, the value of C for thermometers with adequate ventilation (a relative velocity of 3 m per second or more) is 6.6 when the cover of the wet-bulb is saturated with water. On theoretical grounds, a lower factor, 5.8, is appropriate for an ice-covered bulb, but in the tables in general use 6.6 is adopted in this case as well. (Aspirations Psychrometer Tafeln, Braunschweig, 1908. Ferrel, Report of Chief Signal Officer, p. 218. Washington, 1886.) For the reduction of the readings of thermometers exposed in a Stevenson screen, Regnault's values of C, 8 for water and 7 for ice, are generally recommended (Études sur l'Hygrométrie, p. 102. Paris, 1845.) As, however, the ventilation is indeterminate, the accuracy obtainable is of a lower order.

Relative Humidity is computed by expressing e, determined by the psychrometric formula, as a percentage of the pressure of vapor in equilibrium with water (not ice) at the temperature of the dry bulb.

2. Density of Moist Air*

T, T_0 = absolute temperature in °C

Pressure unit	d
Any unit	$\frac{d_0 T_0}{T}\left(\frac{B - 0.3783e}{A_n}\right)$; $\frac{d_0 T_0 B}{T B_0}\left(\frac{0.6217(1 + x)}{0.6217 + x}\right)$
Mm Hg	$\frac{464.6}{10^6}\left(\frac{B - 0.3783e}{T}\right)$g/cm³; $\frac{288.9}{10^6}\left(\frac{B(1 + x)}{(0.6217 + x)T}\right)$g/cm³
Kilodynes per cm²	$\frac{348.5}{10^6}\left(\frac{B - 0.3783e}{T}\right)$g/cm³ $\frac{216.7}{10^6}\left(\frac{B(1 + x)}{(0.6217 + x)T}\right)$g/cm³

$$x = \frac{\text{mass of vapor}}{\text{mass of dry air}} = \frac{0.6217\ e}{B - e}$$

Tables in Dictionary of Applied Physics **3**: 76, and in paper by **Shaw and** Fahmy in Quart. J. Roy. Meteorological Soc., 1925, 210.

$$\text{Specific humidity} = \frac{\text{mass of vapor}}{\text{total mass}} = \frac{0.6217\ e}{B - 0.3783\ e}$$

3. Relations Connecting Pressure and Altitude.—V. Bjerknes defines "virtual" temperature (T') as $T' = TB/(B - 0.3783e)$.

$$\frac{dB}{B} = d\,(\log_e B) = -\frac{gd}{B}dh = -0.03416\frac{g}{g_s}\cdot\frac{dH}{T'} = -\frac{g}{29.26\ g_s}\cdot\frac{dH}{T'} \quad (1)$$

$$d(\log_{10} B) = -\frac{0.014842\ g}{g_s}\cdot\frac{dH}{T'} = -\frac{g}{67.38\ g_s}\cdot\frac{dH}{T'} \quad (2)$$

If suffix $_1$ refers to the lower station and $_2$ to the upper, then

$$\log_{10}\frac{B_1}{B_2} = 0.014842\frac{g}{g_s}\cdot\frac{2(H_2 - H_1)}{T'_1 + T'_2}, \text{ approx.} \quad (3)$$

$$B_1 = B_2\left[1 + 0.03416\frac{g}{g_s}\cdot\frac{2(H_2 - H_1)}{T'_1 + T'_2 - 0.03416\,(H_2 - H_1)\frac{g}{g_s}}\right], \text{ approx.} \quad (4)$$

$$H_2 - H_1 = \frac{29.26\ g_s}{g}\cdot\frac{B_1 - B_2}{B_1 + B_2}(T'_1 + T'_2), \text{ approximately.} \quad (5)$$

For $(H_2 - H_1)$ not exceeding 1000 m, equations (4) and (5) are equivalent to the logarithmic formula. The factor $g/g_s = (1 - 0.002640 \cos 2\phi)(1 - 3.14H \times 10^{-7})$ may generally be taken as unity. The distinction between virtual and actual temperature may be ignored except when high temperatures are involved.

In the determination of heights in an extended barometric survey of a country, allowance must be made for the horizontal pressure gradient. When daily weather maps are available, B_1 may be taken from them as the pressure at sea-level in the neighborhood. If T_1 is not known, the conventional value (adopted by Intern. Meteorological Conference, Innsbruck, 1905) $T_1 = T_2 + 0.005\ (H_2 - H_1)$ may be used, but in hot weather $T_1 = T_2 + 0.01\ (H_2 - H_1)$ is a better approximation. Value of T_2 observed at a mountain station may differ considerably from the temperature of free atmosphere at same level; this is especially true in calm weather, at night, and in the early morning. (*cf.* Hesselberg, Int. Meterol. Conference, Utrecht, 1923, App. L.) Tables of virtual temperatures: V. Bjerknes, Dynamic Meteorology, etc., Washington, 1911. Values of 0.01484/*T*: Computer's Handbook of Meteorological Office, London, **2**: 45.

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* If d_w, d_a = density of vapor and of dry air at same pressure and temperature, d_w/d_a = 0.6217 and $(d_a - d_w)/d_a$ = 0.3783.

Graduation of Aneroids.—The height scales on aneroids designed for the use of travellers, are graduated on the assumption that the temperature of the atmosphere is constant and independent of the altitude. Various standard temperatures, such as 50°F and 0°C have been used. For such scales, especially when applied to aircraft use, the difference between the indicated and the true height may be excessive.

The International Commission for Aerial Navigation adopted in 1925 a scale based on the following conventions (*cf.* Dict. Applied Physics **3**: 182): (*a*) Pressure at sea-level is $A_n = 1.0132 \times 10^6$ dynes/cm²; (*b*) temperature at sea-level is 15°C; (*c*) temperature decreases by 6.5°C per km, up to 11 km; and above 11 km is constant at −56.5°C; (*d*) humidity may be ignored; (*e*) value of g is same at all heights and $= g_{45}$ (essentially g_*). Whence, denoting the pressure and density at sea-level by B_1, and d_1; those at 11 000 m by $B_{11\,000}$ and $d_{11\,000}$:

$$\frac{B}{B_1} = \left(\frac{288 - 0.0065\,H}{288}\right)^{5.256};\ \frac{d}{d_1} = \left(\frac{288 - 0.0065\,H}{288}\right)^{4.256};$$

if H ≯ 11 000 m.

$$\log_{10}\frac{B_{11\,000}}{B} = \log_{10}\frac{d_{11\,000}}{d} = \frac{H - 11\,000}{14\,600},\ \text{if } H > 11\,000\,\text{m}$$

	Unit	Value	Log₁₀
B_1	mm	760	2.88081
B_1	kilodyne/cm²	1013.2	3.00570
d_1	g/m³	1226	3.08849
$B_{11\,000}$	mm	169.6	2.22943
$B_{11\,000}$	kilodyne/cm²	226.1	2.35432
$d_{11\,000}$	g/m³	364	2.56104

As the regulations drawn up by the I. C. A. N. are ambiguous, attention must be drawn to the fact that whilst the altimeter reading, *H*, gives the pressure uniquely, it cannot give the temperature and density of the air. Hence the formulae for *d* are on quite a different footing from those for *B*. (*Cf.* Section on Aerodynamics, Ed.)

VOLUMES OF LIQUID MENISCI

F. A. Gould

As used in this section, the volume (V_m) of the liquid meniscus in a vertical, circular cylinder = volume of the liquid which lies below the capillary surface and between two horizontal planes, one tangent to the meniscus, and the other passing through the line in which the meniscus meets the wall of the tube. The value of V_m depends upon the surface tension (γ), the acceleration of gravity (g), the difference (ρ) in the densities of the fluids separated by the surface, the radius (r) of the cylinder, and the angle (θ) at which the capillary surface meets the wall of the cylinder. If θ is variable and not too small, it is more convenient to use the height (h_m) of the meniscus (= distance between the planes mentioned), than θ, as one of the variables. This has been done in Tables 1 and 2, which give the volume of the mercury meniscus for $\gamma = 400$ mg wt./cm (= 392.27 dynes/cm, $g = 980.665$), $\rho =$ 13.55g/cm³. This value of γ is close to the mean of the values corresponding to the experimental determinations of V_m by Scheel and Heuse (*8*, **33**: 295; 10) (425 mg/cm), and by Palacios (*139*, **17**: 295; 19. *63*, **24**: 152; 23) (406 to 326 mg/cm); an idea of the error which is associated with a departure of the actual value of γ from that assumed may be obtained by comparing their values with those here given. (*See also* Schalkwijk, *168*, No. **67**, and *64 V*, **8**: 462; 00. **9**: 512; 01.)

If $\theta = 0$, it is convenient to tabulate the dimensionless quantities V_m/r^3 and $h_c/r = V_m/\pi r^3$ as functions of $g\rho r^2/\gamma$, as is done in Table 3. [$g\rho r^2/\gamma = r^2/a_1^2$. where a_1 is capillary constant (British usage), *see* section Technical Terms (p. 34); h_c = length of circular cylinder of radius r and volume V_m].

TABLE 1.—VOLUME (V_m) OF MERCURY MENISCUS

h_m = height of meniscus, d = internal diameter of tube. Accuracy for the larger menisci = 0.3 %, for the smaller = 1 %. Unit of V_m = 0.001 cm³; of h_m and d = 1 mm. Assumes γ = 400 mg wt./cm

h_m \ d	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	d / h_m
0.1	0.040	0.159	0.360	0.616	1.02	1.50	2.08	2.75	3.55	4.46	5.49	6.67	7.97	9.42	11.1	12.8	14.8	16.9	19.2	21.6	24.2	27.0	30.0	33.1	0.1
0.2	0.083	0.321	0.723	1.30	2.05	3.00	4.16	5.53	7.12	8.95	11.0	13.4	16.0	18.9	22.2	25.7	29.6	33.9	38.5	43.4	48.6	54.1	60.0	66.3	0.2
0.3	0.134	0.490	1.09	1.95	3.09	4.52	6.26	8.32	10.7	13.5	16.6	20.2	24.1	28.5	33.4	38.7	44.6	51.0	57.8	65.2	73.0	81.3	90.2	99.6	0.3
0.4	0.195	0.669	1.47	2.63	4.14	6.04	8.37	11.1	14.3	18.0	22.3	27.0	32.3	38.1	44.7	51.8	59.6	68.1	77.3	87.1	97.5	109	120	133	0.4
0.5		0.861	1.87	3.31	5.21	7.59	10.5	14.0	18.0	22.7	28.0	33.9	40.6	47.9	56.1	65.0	74.7	85.4	96.9	109	122	136	151	167	0.5
0.6		1.07	2.29	4.01	6.30	9.16	12.7	16.8	21.7	27.3	33.7	40.9	48.9	57.8	67.6	78.3	90.0	103	117	131	147	164	181	200	0.6
0.7		1.31	2.72	4.74	7.43	10.8	14.9	19.7	25.4	32.0	39.5	47.9	57.4	67.8	79.2	91.7	105	120	136	154	172	191	212	234	0.7
0.8		1.56	3.17	5.50	8.58	12.4	17.1	22.6	29.2	36.8	45.4	55.1	65.9	77.8	91.0	105	121	138	156	176	197	219	243	268	0.8
0.9		1.85	3.67	6.29	9.77	14.1	19.4	25.6	33.0	41.6	51.4	62.3	74.5	88.0	103	119	137	160	177	199	222	248	274	303	0.9
1.0			4.19	7.12	11.0	15.8	21.7	28.6	36.9	46.5	57.3	69.6	83.2	98.3	115	133	153	174	197	222	248	276	306	337	1.0
1.1			4.76	7.99	12.3	17.6	24.1	31.8	40.9	51.4	63.5	77.0	92.1	109	127	147	169	192	218	245	274	305	338	372	1.1
1.2			5.39	8.90	13.6	19.5	26.6	35.0	44.9	56.5	69.7	84.5	101	119	139	161	185	211	238	268	300	334	369	407	1.2
1.3			6.07	9.88	15.0	21.4	29.1	38.2	49.1	61.7	76.0	92.1	110	130	152	176	201	229	260	292	326	363	402	443	1.3
1.4				10.9	16.4	23.4	31.7	41.7	53.3	66.9	82.4	99.9	119	141	164	190	218	248	281	316	353	392	434	478	1.4
1.5				12.1	18.0	25.4	34.5	45.2	57.8	72.3	89.0	108	129	152	177	205	235	268	303	340	380	422	468	515	1.5
1.6				13.3	19.6	27.6	37.3	48.8	62.3	77.8	95.7	116	138	163	190	220	253	287	325	365	407	453	501	552	1.6
1.7					21.4	29.8	40.2	52.6	67.0	83.6	103	124	148	175	204	236	270	307	347	390	436	484	535	589	1.7
1.8					23.2	32.2	43.3	56.4	71.7	89.5	110	133	158	186	218	251	288	328	370	415	464	515	570	628	1.8
1.9						34.8	46.5	60.4	76.7	95.5	117	141	168	199	232	268	306	349	393	441	493	547	605	666	1.9
2.0						37.4	49.8	64.6	81.9	102	124	150	179	211	246	284	325	370	417	468	522	580	641	706	2.0
2.1							53.4	69.1	87.3	108	132	159	190	224	261	301	344	391	441	495	552	614	678	746	2.1
2.2								73.7	93.0	115	140	169	201	237	276	318	364	413	466	523	583	648	716	787	2.2
2.3									98.9	122	149	179	213	250	291	336	384	436	492	552	615	683	754	829	2.3
2.4										130	158	189	225	264	307	354	405	459	518	581	648	719	794	872	2.4
2.5											167	200	237	279	324	373	427	484	546	612	681	755	833	915	2.5

Table 2.—Height (h_c) of Cylinder Equivalent to Volume (V_m) of Mercury Meniscus

$h_c = V_m/\pi r^2$ = length of tube of radius r and volume V_m; h_m = height of meniscus; $d = 2r$ = diameter of tube. Accuracy and basis are same as for Table 1

Unit of h_c, h_m, and d = 1 mm. Assumes γ = 400 mg wt./cm

h_m \ d	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	d / h_m
0.1	0.051	0.051	0.051	0.051	0.052	0.053	0.054	0.055	0.056	0.057	0.058	0.059	0.060	0.061	0.063	0.064	0.065	0.066	0.068	0.069	0.070	0.071	0.072	0.073	0.1
0.2	0.106	0.102	0.102	0.103	0.104	0.106	0.108	0.110	0.112	0.114	0.116	0.118	0.121	0.123	0.126	0.128	0.131	0.133	0.136	0.138	0.140	0.142	0.144	0.147	0.2
0.3	0.171	0.156	0.155	0.155	0.157	0.160	0.163	0.165	0.168	0.172	0.175	0.178	0.182	0.185	0.189	0.192	0.196	0.200	0.204	0.208	0.211	0.214	0.217	0.220	0.3
0.4	0.248	0.213	0.209	0.209	0.211	0.214	0.218	0.221	0.225	0.230	0.234	0.239	0.243	0.248	0.253	0.257	0.263	0.268	0.273	0.277	0.281	0.286	0.290	0.294	0.4
0.5		0.274	0.265	0.263	0.265	0.268	0.273	0.278	0.283	0.288	0.294	0.300	0.306	0.311	0.318	0.323	0.329	0.336	0.342	0.348	0.353	0.358	0.363	0.368	0.5
0.6		0.341	0.323	0.319	0.321	0.324	0.329	0.335	0.341	0.348	0.355	0.362	0.368	0.375	0.383	0.389	0.397	0.404	0.411	0.418	0.421	0.430	0.437	0.443	0.6
0.7		0.416	0.385	0.377	0.378	0.381	0.386	0.392	0.400	0.408	0.416	0.424	0.432	0.440	0.448	0.456	0.465	0.473	0.481	0.489	0.496	0.504	0.511	0.518	0.7
0.8		0.497	0.449	0.438	0.437	0.440	0.444	0.450	0.459	0.468	0.478	0.487	0.496	0.506	0.515	0.524	0.533	0.542	0.551	0.561	0.569	0.577	0.585	0.593	0.8
0.9		0.588	0.519	0.501	0.497	0.499	0.503	0.510	0.519	0.530	0.540	0.551	0.561	0.572	0.582	0.592	0.602	0.613	0.623	0.633	0.642	0.651	0.660	0.669	0.9
1.0			0.593	0.567	0.559	0.560	0.563	0.570	0.580	0.592	0.604	0.615	0.627	0.638	0.650	0.661	0.673	0.684	0.695	0.706	0.716	0.726	0.736	0.746	1.0
1.1			0.674	0.636	0.624	0.623	0.626	0.632	0.643	0.655	0.668	0.681	0.694	0.706	0.719	0.731	0.743	0.756	0.767	0.779	0.790	0.802	0.812	0.823	1.1
1.2			0.762	0.708	0.692	0.689	0.691	0.696	0.707	0.720	0.733	0.747	0.761	0.775	0.788	0.802	0.815	0.828	0.841	0.854	0.866	0.878	0.889	0.900	1.2
1.3			0.859	0.786	0.763	0.756	0.757	0.761	0.772	0.785	0.799	0.815	0.829	0.844	0.859	0.873	0.887	0.902	0.915	0.929	0.942	0.955	0.967	0.979	1.3
1.4				0.896	0.837	0.826	0.825	0.829	0.839	0.852	0.867	0.883	0.899	0.915	0.930	0.946	0.961	0.976	0.991	1.01	1.02	1.03	1.05	1.06	1.4
1.5				0.961	0.915	0.899	0.896	0.900	0.908	0.921	0.936	0.953	0.969	0.986	1.00	1.02	1.04	1.05	1.07	1.08	1.10	1.11	1.13	1.14	1.5
1.6				1.06	1.00	0.976	0.969	0.972	0.980	0.991	1.01	1.02	1.04	1.06	1.08	1.10	1.11	1.13	1.15	1.16	1.18	1.19	1.21	1.22	1.6
1.7					1.09	1.06	1.04	1.05	1.05	1.06	1.08	1.10	1.12	1.13	1.15	1.17	1.19	1.21	1.22	1.24	1.26	1.27	1.29	1.30	1.7
1.8					1.18	1.14	1.12	1.12	1.13	1.14	1.15	1.17	1.19	1.21	1.23	1.25	1.27	1.29	1.31	1.32	1.34	1.36	1.37	1.39	1.8
1.9						1.23	1.21	1.20	1.21	1.22	1.23	1.25	1.27	1.29	1.31	1.33	1.35	1.37	1.39	1.40	1.42	1.44	1.46	1.47	1.9
2.0						1.32	1.30	1.29	1.29	1.30	1.31	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.51	1.53	1.54	1.56	2.0
2.1							1.39	1.37	1.37	1.38	1.39	1.41	1.43	1.45	1.47	1.50	1.52	1.54	1.56	1.58	1.59	1.61	1.63	1.65	2.1
2.2								1.47	1.46	1.47	1.48	1.50	1.52	1.54	1.56	1.58	1.60	1.62	1.64	1.66	1.68	1.70	1.72	1.74	2.2
2.3									1.55	1.56	1.57	1.58	1.60	1.63	1.65	1.67	1.69	1.71	1.73	1.76	1.78	1.80	1.82	1.83	2.3
2.4										1.65	1.66	1.68	1.69	1.72	1.74	1.76	1.78	1.80	1.83	1.85	1.87	1.89	1.91	1.93	2.4
2.5											1.76	1.77	1.79	1.81	1.83	1.86	1.88	1.90	1.92	1.95	1.97	1.99	2.01	2.02	2.5

Table 3.—Volume (V_m) of Liquid Meniscus, $\theta = 0$

(Meniscus concave upwards)

As quantities tabulated are dimensionless, any consistent system of units may be used. g = acceleration of gravity, r = radius of tube, h_c = length of tube of radius r and volume V_m. (Computed from tables of Bashforth and Adams as given in their "Capillary Action.")

$g\rho r^2/\gamma$	V_m/r^3	h_c/r	$g\rho r^2/\gamma$	V_m/r^3	h_c/r
0	1.048	0.333	4.0	0.649	0.206
0.1	1.029	0.327	4.5	0.623	0.198
0.2	1.010	0.321	5.0	0.599	0.190
0.4	0.978	0.311	5.5	0.578	0.184
0.6	0.947	0.301	6.0	0.557	0.177
0.8	0.919	0.292	6.5	0.537	0.171
1.0	0.894	0.284	7.0	0.518	0.165
1.5	0.837	0.266	7.5	0.501	0.159
2.0	0.789	0.251	8.0	0.484	0.1510
2.5	0.747	0.238	8.5	0.470	0.1493
3.0	0.711	0.226	9.0	0.456	0.1449
3.5	0.678	0.216	9.5	0.442	0.1406
			10.0	0.429	0.1365

Example 1 A gas is collected in a eudiometer over mercury. The volume to the plane through the line of contact of the mercury with the wall of the tube = V_o. If this portion of the eudiometer is a vertical, circular cylinder of diameter d = 10 mm, and if height of meniscus is h_m = 1.5 mm, then V_m = 0.0723 cm³ (Table 1), and the actual volume of the gas is $V = V_o - 0.072$ cm³.

If volumes are expressed in terms of a linear scale engraved upon the cylindrical portion of the eudiometer, and if the scale reading at the line of contact is h_o, and if d = 10 mm, h_m = 1.5 mm, then h_c = 0.921 mm (Table 2), and the actual volume of the gas corresponds to $h_o - h_c = h_o - 0.921$ mm.

Example 2: A gas is collected in a eudiometer over water. The volume to the plane tangent to the bottom of the meniscus = V_o. If this portion of the eudiometer is a vertical, circular cylinder of radius r = 0.5 cm, if γ = 73 dynes/cm, g = 980.7 cm/sec², ρ = 1.000, and $\theta = 0$ (the tube is perfectly wetted by the water), then $g\rho/\gamma$ = 13.43 cm⁻², $g\rho r^2/\gamma$ = 3.36. Hence V_m/r^3 = 0.689 (Table 3), and V_m = 0.086 cm³. Hence the actual volume of the gas is $V_o - V_m = V_o - 0.086$ cm³.

If volumes are expressed in terms of a linear scale engraved upon the cylindrical portion of the eudiometer, and if the scale reading corresponding to the bottom of the meniscus is h_o, then for $g\rho r^2/\gamma$ = 3.36, h_c/r = 0.219 (Table 3), and if r = 5 mm, h_c = 1.10 mm, and the actual volume of the gas corresponds to $h_o - h_c = h_o - 1.10$ mm.

WEIGHTS AND WEIGHING

A. T. Pienkowsky

In this section are considered:—(*A*) Weights—the basis upon which they are adjusted or tested, and their constancy; (*B*) the correcting of weighings for the buoyant effect of the air, including the weighing of substances in containers; and (*C*) the correcting of density determinations for the buoyant effect of the air.

WEIGHTS

Basis of Adjustment.—Most weights are adjusted by the maker according to their apparent weight in air against brass standards. This is equivalent to adjusting brass weights according to their real mass (or "weight in vacuo"), but the true mass values of other weights (*e.g.*, those of platinum, aluminum, or quartz) may be much different from their nominal values. When a set of weights is calibrated, however, the values found may be either true mass or apparent values, depending on the standard used and the method of conducting the test. Certificates from different standardizing laboratories may give values on either basis, or on both.

"Weight in Air against Brass."—Commercial weighing is all based on apparent weight in air against brass standards, this basis being more or less accurately defined in some countries. Precise scientific weighing is based on true mass values (*i.e.*, on "weight in vacuo"), but weights below one gram may be tested and used as if they were of brass, even for work of rather high precision. In so testing these weights, their apparent "values" are computed on the assumption that their density is Δ_b = density of brass (generally Δ_b is taken as 8.4 g per cm³); and in using them the apparent values so found are used as though they were the true masses of the weights, Δ_b being at the same time used just as though it were the true density of the weights. In such cases the error ($m_f - m$) so introduced, arises solely from the fact that the density (σ_1) of the air at the time the values of the weights were determined differs from that (σ) at the time they were used in weighing the object. This error is given approximately by equation (1) in which m is the correct, and m_f is the false mass, s is the nominal value of the weight, Δ_b is the density assumed for brass weights and Δ the actual density of the weights used.

$$m_f - m = s\left(\frac{1}{\Delta_b} - \frac{1}{\Delta}\right)(\sigma_1 - \sigma) \qquad (1)$$

Example: If the value of a platinum 500 mg weight (Δ = 21.5 g/cm³) is determined according to "weight in air against brass" (Δ_b = 8.4 g/cm³) at sea level (σ_1 = 0.0012 g/cm³), and this value is used at an altitude of 5000 ft. (σ = 0.0010 g/cm³) the error in the mass of a body as so weighed will be $m_f - m$ = 0.007 mg.

"Apparent" densities or specific gravities determined according to apparent "weight in air against brass" are subject not merely to variations in the density of the air, but also to differences in experimental technique (see p. 78 to 80).

Constancy.—Data on changes in weights can indicate only the order of magnitude of such changes, and as a rule can show only what *may* happen, since such changes are extremely irregular.

Ordinary brass weights with knobs screwed in (whether gold plated, platinum plated, or lacquered) may continue to gain in weight for many years, and may do so without developing any visible signs of such change. The following examples are typical of extreme changes that sometimes occur. Larger changes have been recorded.

Denomination	g	100	50	20	10	5	2	1
Gain in 6 yr	mg	1.7	1.2	0.8	0.7	0.6	0.8	0.3
Gain in 14 yr	mg	3.3	3.9	1.8	2.5	0.8	0.3	1.1

The following is typical of what has often happened when new weights were not used and were carefully protected.

Denomination	g	100	50	20	10	5	2	1
Gain in 5 mo	mg	0.1	0.1	0.0	0.1	0.1	0.0	0.0
Gain in 1 yr	mg	0.2	0.1	0.0	0.0	0.1	0.0	0.0

Lacquered weights of good quality are less subject to spotting and general surface tarnishing than are the gold or platinum plated weights often sold. Lacquered weights, however, are subject to rapid variations caused by changes in the relative humidity of the air. Lacquered weights of about 20 to 100 g may be expected to vary 0.1 or 0.2 mg with large variations in humidity. Changes of over 0.5 mg have been recorded.

Sets of weights of the ordinary type may, however, be very constant. For example, one set was used for over a year with changes less than 0.02 mg and few changes over half that amount; and two sets were used occasionally for 17 and 18 yr, respectively, with no changes over 0.2 mg.

For reference standards, one-piece weights are very much more reliable than the common screw-knob type. The following changes in a high grade, gold plated, bronze set of this type are typical for weights used little and with great care. Positive changes are gains, negative changes losses.

Denomination.	g	50	20	20	10	5	2	2	1
Changes in 15 yr	mg	−0.12	0.00	0.02	−0.01	−0.006	0.001	0.008	−0.007

Solid platinum or platinum-iridium weights of moderate size may be expected to remain constant within about 0.01 mg if handled with sufficient care and protected from dust and other deposits. The sheet metal weights below one g are not much more constant than this; very good weights kept with extreme care as reference standards may stay within 0.001 mg for some years, but this cannot safely be assumed. If these small weights are much used, even with good care, losses of 0.01 mg may soon be expected in the larger ones.

CORRECTING OF WEIGHINGS FOR BUOYANT EFFECT OF THE AIR

("Reduction of Weighings to Vacuo")

In addition to a sufficiently sensitive balance, accurate weighing requires (1) that the balance itself maintain a sufficiently constant zero point and ratio of arms of the beam; (2) that the effect of inequality of the arms of the beam be eliminated by the method of weighing, since it cannot as a rule be corrected for with sufficient accuracy; (3) that the object and the weights ha[illegible] definite constant values, free from such effects as variable surface [illegible] evaporation, magnetic attractions, etc.; (4) that surrounding conditions be maintained free from sources of disturbance and error, such as electrostatic attractions, convection currents, variable or unsymmetrical heat radiations, etc.; and (5) that proper correction be made for the buoyant effect of the air.

The first four types of requirements are matters of technique, and no general methods of correction can be used for errors arising from them. They are therefore outside the scope of these tables.

The fifth requirement demands definite formulae and facts, some of the most fundamental or general of which are given below.

The phrase "apparent weight" is commonly used for the result of a weighing in which no correction has been made for the buoyant effect of the air. The phrase is ambiguous[1] and often leads to a confusion of ideas. Therefore this term is not used in the equations of this section, but reference is made directly to the weights that would be used on an equal-arm balance to make the weighings. The phrase "weights needed" must be understood to include the proper fraction of the rider or other small weights needed to make up the total amount; and it refers to *actual* values of the weights, which may or may not equal the nominal values marked on them.

Symbols.—

a mass of the contents of the "empty" portions of the container. (In weighing gases a is zero. In weighing solids or liquids it may be the mass of air or of vapor of the solid or liquid. In weighing a pyknometer with the liquid which fills it at a temperature different from that at which it is weighed, the volume occupied by a results from the unequal expansion of pyknometer and liquid)

b $(v_s - v_c)/v_s$. Relative size of the container and its counterpoise

c mass of counterpoise

k buoyancy reduction factor

l mass of liquid that fills the pyknometer at the established filling temperature

m mass of object; in general or where its volume is not fixed by the volume of a pyknometer

p mass of pyknometer or other container

r error resulting from use of approximate buoyancy formula

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[1] Compare equations (8) and (9); in each case $s'' - s'$ would be called the apparent weight, but its value in (9) is $v_m\sigma$ greater than in (8).

s **mass of weights needed on an equal arm balance, whether with or without special counterpoise, to balance the objects being weighed. (Regarding use of other than true mass values, *see* p. 73)**

s_e $s - v_e\sigma = s\,(1 - \sigma/\Delta)$. **This is *not*** "weight in vacuo" as that **phrase is often used**

t **temperature. If accented it is the temperature at the time of the indicated weighing; if unaccented, it is the temperature at which the pyknometer is filled. In so far as their temperatures have any effect upon the operation considered, all objects (*e.g.*, the balance, its loads, and the surrounding air) are assumed to be at the same temperature**

v volume or capacity; when without subscript it is capacity of the container at time of weighing; with one of the subscripts a, c, l, m, p, s, or w, it is volume of the object whose mass is indicated by the subscript (*e.g.*, v_m = volume of the object whose mass is m)

v_t capacity of the pyknometer at the temperature of filling

v_p volume of the pyknometer itself, excluding the space that would be filled by liquid at the temperature of filling. (Ordinarily v_p = volume of the material of which the pyknometer is constructed)

v_e "exterior volume" of the pyknometer or other container. With pyknometers, at temperature of filling, $v_e = v_p + v_t$; at another temperature, t'', v_e''-$v_p'' + v'' = v_p'' + v_w'' + v_a''$

w mass of the calibrating liquid (*e.g.*, water) which is used to determine a volume or to serve as a standard of density

β cubical coefficient of thermal expansion

Δ density of the weights at the time of weighing

σ density of the air at the time of weighing

ρ density of object being studied or of calibrating liquid. If accented it is density at time of weighing; if unaccented it is density at temperature (t) at which the pyknometer was filled

Density is true mass per unit of volume.

Accents denote the weighing to which the quantity applies. In general ′ denotes the weighing of the object alone or of the container; ″ denotes the weighing of the combined container and object studied, or of the container filled with the calibrating liquid or of the object suspended in the calibrating liquid; ‴ denotes the weighing of the pyknometer "filled" with liquid to be studied, or "filled" with object studied plus calibrating liquid.

Subscripts.—$_f$ denotes false or erroneous values. For $_e$ see above (s_e and v_e). Other subscripts indicate the object to which the quantity applies; *e.g.*, ρ_a = density of material whose mass is a.

Fundamental Exact Equation.—The use of the direct, fundamental, exact equation (2) avoids many complications and approximations introduced by most formulae based on densities.

$$m = s + (v_m - v_s)\sigma \qquad (2)$$

The equation using densities, in one of the exact forms (3) given below, is useful chiefly for computing exact tables, or the effect of errors, approximations, etc. As a rule, either the densities are not known well enough to warrant its use, or the volumes involved will have been measured, thus going back to equation (2).

$$m = s\left(\frac{1 - \dfrac{\sigma}{\Delta}}{1 - \dfrac{\sigma}{\rho_m}}\right) = s\frac{\rho_m(\Delta - \sigma)}{\Delta(\rho_m - \sigma)} = s\left\{1 + \frac{\sigma(\Delta - \rho_m)}{\Delta(\rho_m - \sigma)}\right\} =$$

$$s + s\frac{\sigma(\Delta - \rho_m)}{\Delta(\rho_m - \sigma)} \qquad (3)$$

In the last form of (3), the second term is the exact "buoyancy correction term," and in this correction term the factor (fraction) by which s is multiplied is the exact "buoyancy reduction factor" (k). See Tables 2 and 3.

Common Equation Using Densities.—Some form of **equation (4)** is commonly used for reducing weighings. **This equation is not** exact. It is entirely inapplicable to weighing **gases, but is amply** accurate for much work with solids and liquids.

$$m = s + s\sigma\left(\frac{1}{\rho_m} - \frac{1}{\Delta}\right) \qquad (4)$$

The factor $\sigma\left(\frac{1}{\rho_m} - \frac{1}{\Delta}\right)$ is the "buoyancy reduction factor" commonly given. When the densities lie between 0.5 and **21.5 g per** cm³, and are known with sufficient accuracy, the error (r) introduced by the use of this formula does not exceed one **part in 100 000** of the mass of the object weighed. **Its value, and that of the** proportional error ($r' = r/s$) may be calculated **by formula (5);** their orders of magnitude may readily be determined **from Table 1,** which is based on σ = 0.0012 g/cm³.

$$r' = \frac{r}{s} = \frac{\sigma^2(\Delta - \rho_m)}{\Delta\rho_m(\rho_m - \sigma)} \qquad (5)$$

TABLE 1

Unit of Density is g/cm³

ρ_m	100 r'		
	Δ = 21.5	Δ = 8.4	Δ = 2.65
1.00	0.0001	0.0001	0.0001
0.5	0.0006	0.0005	0.0005
0.05	0.06	0.06	0.06
0.005	8	8	7.

Density of the Air.—Variations in the density of the **air under** standard conditions,[1] as well as the uncertainties **of its experimental** determination, limit the precision with which **very large** or extremely precise buoyancy corrections can be calculated **from** tables of air density. The former seems at present to be **the larger,** and therefore sets a fixed limit which can be exceeded **only by** eliminating or reducing the size of the correction, or **by making** an experimental determination of the density of the **air at the time** of the weighing. These limiting uncertainties are of **the order of** 5 in 10⁴ and affect the total buoyancy correction in the **same ratio.** Since they affect only the fourth significant figure in the buoyancy reduction factor they are negligible in the use of Tables 2 and 3.

In weighing gases, the density of the air must be found from precise tables (consult index). When the volume of the gas is not compensated by a counterpoise of the same size, the density of the air must be known with approximately the same precision as is desired for that of the gas; when it is so compensated, the buoyancy correction is generally the total buoyancy on the weights, and therefore is still relatively large.

For most work with solids and liquids an approximate value of the density of the air is sufficient. The precision to which it must be known can be found from an examination of Table 2. It should be noted that a precision of 1 in 10^n in the mass to be determined requires a precision of 1 in the n'th decimal place of the buoyancy reduction factor (*i.e.*, in the actual factor k, not in the printed value of $1000k$). In getting the buoyancy reduction factor from Table 2, and in similar work, to a precision not greater than one in about 10^5, the density of the air may be found from the "Air Density Chart," Fig. 1.

The precision to which temperature, pressure, and humidity must be known in order to find the density of the air to the necessary precision, may be inferred from Fig. 1, except in the case of very large corrections, or of corrections to be determined with extreme precision. In the latter cases this information must be sought in other places.

Density of the Weights.—If the density of the air in which the weights are used is the same as that in which their values were determined, errors in the density assumed for the weights will have no effect on the accuracy with which the mass of the object may be determined, provided the same density that was assumed for them in determining their values is assumed for them when they are used. It is not necessary, therefore, to know the density of the weights as accurately as that of the object weighed.

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[1] Treuthart, *34*, **172**: 1598, 21. Moles, *34*, **172**: 1600, 21.

If weights are used in air whose density differs by not more than 20% from that of the air in which their values were determined, the amount by which the density of ordinary weights is likely to differ from the values used in Tables 2 and 3 will not cause errors greater than one part in about 100,000 in the determination of the mass of the object weighed; provided that the density used in determining the value of the weight is the same as that used in the computation of the mass.

For a precision above one part in a million, it is frequently necessary to measure the volume or density of each weight.

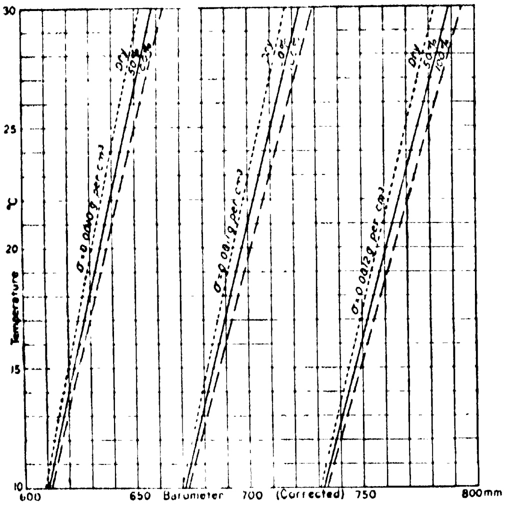

Fig. 1.—Air density chart (For use with Tables 2 and 3.)

Ordinary two-piece weights are not used for such work because they cannot safely be put into liquids for hydrostatic weighing.

Aluminum is not used for weights above 0.02 g in high quality weights, nor above 0.5 g in second quality sets. When the values of such weights have been determined on the assumption of a density of 2.7 g per cm³ at 0°C, the use of the buoyancy reduction factors given for quartz in Table 2 introduces an error in the mass of the object weighed, of less than 0.0002 mg for amounts up to 0.02 g, and of less than 0.005 mg for amounts up to 0.5 g.

The densities of most gold alloys used for weights lie between 16 and 18 g per cm³. For gold within this range, the use of the factors given in Tables 2 and 3 will not introduce errors greater than one part in 200,000, or not over 0.005 mg in weighing amounts under one g.

In Tables 2 and 3, the densities used for weights of platinum or platinum-iridium, for those of brass or bronze, and for those of aluminum, are those which were adopted many years ago for certifying weights at the National Bureau of Standards of the United States of America, and were assumed as the densities at 0°C. The following coefficients of cubical expansion are assumed in reducing the volumes of such weights to the volumes at 20°C.

Platinum and Platinum-iridium	0.000 026 per deg. C
Brass or bronze	0.000 054 per deg. C
Aluminum	0.000 069 per deg. C

The densities of gold and of crystal quartz are assumed as the densities at 20°C. All buoyancy reduction factors are based on differences in volume at 20°C.

Density of Object Weighed.—A change of one in 10^n of the mass of the object corresponds to a change of one in the n'th decimal place of the buoyancy reduction factor. Therefore, to the precision obtainable by the use of Table 2, the precision required in the density of the object may be found by noting in that table what change in density (at approximately the density under consideration) corresponds to the allowable variation in the buoyancy reduction factor.

The use of "standard" or "adopted" densities for the object weighed may give an accuracy which is entirely fictitious. There is no compensation as in the case of weights, and the actual error or uncertainty in the density of the particular object weighed has its full effect in the error or uncertainty of the calculated mass

A fictitious "apparent" density derived from weighings uncorrected for buoyancy of the air must be corrected to true density before being inserted in the formulae given in this section unless only an approximate value of density is needed (see p. 78).

Temperature of Objects and Weights.—In weighing gases, and to secure the highest precision in many other cases, it is necessary to compute all volumes or densities at the actual temperature of the observations, unless the coefficient of expansion of the object happens to be nearly the same as that of the weights. If the temperature is entirely neglected, and weighings are made at room temperatures, the extreme error likely to be introduced in the mass calculated for solids and liquids is less than three in 10^4. (This would be the error for material having a density of 0.2 g per cm³ at 0°C, and a coefficient of cubical expansion of 1.6 × 10^3, when compared with weights whose actual volumes or densities are those used in the calculation.)

Example 1: The actual mass of the weights used was s = 10.0105 g; the corrected barometric height was 758 mm; air temperature, 19.6°C; relative humidity 25%; density of object 3.5 g/cm³; weights were of brass.

Referring to Fig. 1, the air density corresponding to these conditions is seen to be close to 0.0012 g/cm³. Entering Table 2 with $\rho_m = 3.5$ and the column for brass weights, under $1000\sigma = 1.2$, it is found that 1000 k is 0.20; hence the mass of the object is $m = s + ks = 10.0105 + 0.000\,20 \times 10.0105 = 10.0105 + 0.0020 = 10.0125$ g.

Example 2: The factor for $\rho_m = 3.0$ differs by 6 in the fifth decimal place from that for $\rho_m = 3.5$. The error in mass produced by using 3.0 in place of 3.5 as the density of the object is therefore 6 parts in 10^6. For the object in Example 1 this would be an error of 0.000 6 g. Similarly the use of 7.0 instead of 7.5 for ρ_m would produce an error of about one part in 10^4 in the mass of the object.

Example 3: In Fig. 1 the point corresponding to barometric height 720 mm, air temperature 21°C, and relative humidity 50%, lies to the right of the line for 0.0011 g/cm³, 50%, by $^{10}/_{32}$ of the distance between the 0.0011 and the 0.0012 lines. Hence, $\sigma = 0.0011 + 0.0001 \times {}^{10}/_{32} = 0.00113_1$ g/cm³. (For most work for which Table 2 is suited the density can be estimated by eye with sufficient accuracy; as in this case, 0.00113 g/cm³.) The factor from Table 2 may then be found either by multiplying the factor for $1000\sigma = 1.0$ by 1.13 or by interpolating between the factor for $1000\sigma = 1.1$ and that for $1000\sigma = 1.2$. For brass weights and $\rho_m = 3.5$ the former gives $0.17 \times 1.13 = 0.19_2$ as the value of $1000k$. A calculated interpolation between 0.18 and 0.20 gives 0.18_6, which agrees with the other value within the accuracy of such tabular interpolations.

Weighing Objects in Containers.—Two weighings are required; one of the container alone and the other with the object in the

TABLE 2.—BUOYANCY REDUCTION FACTOR (k)

$$m = s + ks, \text{ where } k = \frac{\sigma(\Delta - \rho_m)}{\Delta(\rho_m - \sigma)}$$

(*Cf* equation (3). Symbols, p. 74.) Unit of density is g/cm³ or, to precision of this table, g/ml)

Density of object weighed ρ_m	1000 k											
	$\Delta = 21.5$ Pt or Pt-Ir			$\Delta = 17$ Gold			$\Delta = 8.4$ Brass or bronze			$\Delta = 2.65$ Crystal quartz or aluminum*		
	1000 σ =			1000 σ =			1000 σ =			1000 σ =		
	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2
0.2	4.98	5.48	5.98	4.97	5.47	5.97	4.91	5.40	5.89	4.65	5.11	5.58
0.3	3.30	3.63	3.96	3.29	3.62	3.95	3.22	3.55	3.87	2.97	3.26	3.56
0.4	2.46	2.71	2.95	2.45	2.69	2.94	2.39	2.63	2.87	2.13	2.34	2.55
0.5	1.96	2.15	2.35	1.95	2.14	2.34	1.88	2.07	2.26	1.63	1.79	1.95
0.6	1.62	1.79	1.95	1.61	1.77	1.93	1.55	1.71	1.86	1.29	1.42	1.55
0.7	1.38	1.52	1.66	1.37	1.51	1.65	1.31	1.44	1.57	1.05	1.16	1.26
0.75	1.29	1.42	1.55	1.28	1.40	1.53	1.22	1.34	1.46	0.96	1.05	1.15
0.80	1.20	1.33	1.45	1.19	1.31	1.43	1.13	1.25	1.36	0.87	0.96	1.05
0.82	1.17	1.29	1.41	1.16	1.28	1.39	1.10	1.21	1.32	0.84	0.93	1.01
0.84	1.15	1.26	1.37	1.13	1.25	1.36	1.07	1.18	1.29	0.81	0.90	0.98
0.86	1.12	1.23	1.34	1.11	1.22	1.33	1.04	1.15	1.25	0.79	0.86	0.94
0.88	1.09	1.20	1.31	1.08	1.19	1.29	1.02	1.12	1.22	0.76	0.83	0.91
0.90	1.07	1.17	1.28	1.05	1.16	1.26	0.99	1.09	1.19	0.73	0.81	0.88
0.91	1.05	1.16	1.26	1.04	1.15	1.25	0.98	1.08	1.18	0.72	0.79	0.87
0.92	1.04	1.15	1.25	1.03	1.13	1.24	0.97	1.06	1.16	0.71	0.78	0.85
0.93	1.03	1.13	1.24	1.02	1.12	1.22	0.96	1.05	1.15	0.70	0.77	0.84
0.94	1.02	1.12	1.22	1.01	1.11	1.21	0.95	1.04	1.13	0.69	0.76	0.82
0.95	1.01	1.11	1.21	0.99	1.09	1.19	0.93	1.03	1.12	0.68	0.74	0.81
0.96	1.00	1.10	1.20	0.98	1.08	1.18	0.92	1.02	1.11	0.67	0.73	0.80
0.97	0.99	1.08	1.18	0.97	1.07	1.17	0.91	1.00	1.09	0.65	0.72	0.79
0.98	0.97	1.07	1.17	0.96	1.06	1.16	0.90	0.99	1.08	0.64	0.71	0.77
0.99	0.96	1.06	1.16	0.95	1.05	1.14	0.89	0.98	1.07	0.63	0.70	0.76
1.00	0.95	1.05	1.15	0.94	1.04	1.13	0.88	0.97	1.06	0.62	0.69	0.75
1.01	0.94	1.04	1.13	0.93	1.03	1.12	0.87	0.96	1.05	0.61	0.67	0.74
1.02	0.93	1.03	1.12	0.92	1.01	1.11	0.86	0.95	1.03	0.60	0.66	0.72
1.03	0.93	1.02	1.11	0.91	1.00	1.10	0.85	0.94	1.02	0.59	0.65	0.71
1.04	0.92	1.01	1.10	0.90	0.99	1.08	0.84	0.93	1.01	0.58	0.64	0.70
1.05	0.91	1.00	1.09	0.89	0.98	1.07	0.83	0.92	1.00	0.58	0.63	0.69
1.06	0.90	0.99	1.08	0.89	0.97	1.06	0.82	0.91	0.99	0.57	0.62	0.68
1.07	0.89	0.98	1.07	0.88	0.96	1.05	0.82	0.90	0.98	0.56	0.61	0.67
1.08	0.88	0.97	1.06	0.87	0.95	1.04	0.81	0.89	0.97	0.55	0.60	0.66
1.09	0.87	0.96	1.05	0.86	0.94	1.03	0.80	0.88	0.96	0.54	0.59	0.65
1.10	0.86	0.95	1.04	0.85	0.94	1.02	0.79	0.87	0.95	0.53	0.59	0.64
1.12	0.85	0.93	1.02	0.83	0.92	1.00	0.77	0.85	0.93	0.52	0.57	0.62
1.14	0.83	0.91	1.00	0.82	0.90	0.98	0.76	0.83	0.91	0.50	0.55	0.60
1.16	0.82	0.90	0.98	0.80	0.88	0.96	0.74	0.82	0.89	0.49	0.53	0.58
1.18	0.80	0.88	0.96	0.79	0.87	0.95	0.73	0.80	0.87	0.47	0.52	0.56
1.20	0.79	0.87	0.95	0.78	0.85	0.93	0.71	0.79	0.86	0.46	0.50	0.55
1.25	0.75	0.83	0.91	0.74	0.82	0.89	0.68	0.75	0.82	0.42	0.47	0.51
1.30	0.72	0.80	0.87	0.71	0.78	0.85	0.65	0.72	0.78	0.39	0.43	0.47
1.35	0.69	0.76	0.83	0.68	0.75	0.82	0.62	0.68	0.75	0.36	0.40	0.44
1.40	0.67	0.74	0.80	0.66	0.72	0.79	0.60	0.66	0.71	0.34	0.37	0.40
1.50	0.62	0.68	0.74	0.61	0.67	0.73	0.55	0.60	0.66	0.29	0.32	0.35
1.6	0.58	0.64	0.69	0.57	0.62	0.68	0.51	0.56	0.61	0.25	0.27	0.30
1.7	0.54	0.60	0.65	0.53	0.58	0.64	0.47	0.52	0.56	0.21	0.23	0.25
1.8	0.51	0.56	0.61	0.50	0.55	0.60	0.44	0.48	0.52	0.18	0.20	0.21
1.9	0.48	0.53	0.58	0.47	0.51	0.56	0.41	0.45	0.49	0.15	0.16	0.18
2.0	0.45	0.50	0.54	0.44	0.49	0.53	0.38	0.42	0.46	0.12	0.14	0.15
2.2	0.41	0.45	0.49	0.40	0.44	0.48	0.34	0.37	0.40	0.08	0.08	0.09
2.4	0.37	0.41	0.44	0.36	0.39	0.43	0.30	0.33	0.36	0.04	0.04	0.05
2.6	0.34	0.37	0.41	0.33	0.36	0.39	0.27	0.29	0.32	0.01	0.01	0.01
2.8	0.31	0.34	0.37	0.30	0.33	0.36	0.24	0.26	0.29	−0.02	−0.02	−0.02
3.0	0.29	0.32	0.34	0.27	0.30	0.33	0.21	0.24	0.26	−0.04	−0.05	−0.05
3.5	0.24	0.26	0.29	0.23	0.25	0.27	0.17	0.18	0.20	−0.09	−0.10	−0.11
4	0.20	0.22	0.24	0.19	0.21	0.23	0.13	0.14	0.16	−0.13	−0.14	−0.15
5	0.15	0.17	0.18	0.14	0.16	0.17	0.08	0.09	0.10	−0.18	−0.20	−0.21
6	0.12	0.13	0.14	0.11	0.12	0.13	0.05	0.05	0.06	−0.21	−0.23	−0.25
7	0.10	0.11	0.12	0.08	0.09	0.10	0.02	0.03	0.03	−0.23	−0.26	−0.28
8	0.08	0.09	0.09	0.07	0.07	0.08	0.01	0.01	0.01	−0.25	−0.28	−0.30
9	0.06	0.07	0.08	0.05	0.06	0.06	−0.01	−0.01	−0.01	−0.27	−0.29	−0.32
10	0.05	0.06	0.06	0.04	0.05	0.05	−0.02	−0.02	−0.02	−0.28	−0.31	−0.33
12	0.04	0.04	0.04	0.02	0.03	0.03	−0.04	−0.04	−0.04	−0.29	−0.32	−0.35
14	0.02	0.03	0.03	0.01	0.01	0.02	−0.05	−0.05	−0.06	−0.31	−0.34	−0.37
16	0.02	0.02	0.02	0.00	0.00	0.00	−0.06	−0.06	−0.07	−0.31	−0.35	−0.38
18	0.01	0.01	0.01	0.00	0.00	0.00	−0.06	−0.07	−0.08	−0.32	−0.35	−0.39
20	0.00	0.00	0.00	−0.01	−0.01	−0.01	−0.07	−0.08	−0.08	−0.33	−0.36	−0.39
22	0.00	0.00	0.00	−0.01	−0.01	0.02	−0.07	−0.08	−0.09	−0.33	−0.37	−0.40

* See Density of Weights, p. 75

container. The exact equations connecting the masses and corresponding to equation (2) are:

$$(p' + a') = (s' + c') + [v_s' - (v_s' + v_c')]\sigma'$$

and

$$(p'' + m + a'') = (s'' + c'') + [v_s'' - (v_s'' + v_c'')]\sigma''$$

Assuming p and c to be constant, as must generally be done, and subtracting, gives the general equation (6).

$$m = (s'' - s') - (a'' - a') + [v_s'' - (v_s'' + v_c'')]\sigma'' - [v_s' - (v_s' + v_c')]\sigma' \quad (6)$$

If also v_s, v_c, Δ and σ are the same for both weighings, which requires the same temperature and equivalent atmospheric conditions,

$$m = (s'' - s') - (a'' - a') - (v_s'' - v_s')\sigma \quad (7)$$

TABLE 3.—BUOYANCY REDUCTION FACTOR (k) FOR USE IN INTERCOMPARISON OF WEIGHTS

(For other factors and for symbols, see Table 2 and p. 74)

$m = s + ks$

Unity of density = g/cm³

Density of weight tested ρ_m	1000k														
	Δ* = 21.5 Pt or Pt-Ir			Δ† = 17 Gold			Δ* = 8.4 Brass or bronze			Δ* = 2.7 Aluminum			Δ† = 2.65 Crystal quartz		
	1000σ =			1000σ =			1000σ =			1000σ =			1000σ =		
	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2	1.0	1.1	1.2
21.5*	0.000	0.000	0.000	−0.012	−0.014	−0.015	−0.073	−0.080	−0.087	−0.324	−0.357	−0.389	−0.331	−0.364	−0.397
17†	0.012	0.014	0.015	0.000	0.000	0.000	−0.060	−0.066	−0.072	−0.312	−0.343	−0.374	−0.319	−0.350	−0.382
8.4*	0.073	0.080	0.087	+0.060	+0.066	+0.072	0.000	0.000	0.000	−0.252	−0.277	−0.302	−0.258	−0.284	−0.310
2.7*	0.324	0.357	0.389	0.312	0.343	0.375	+0.252	+0.277	+0.302	0.000	0.000	0.000	−0.006	−0.007	−0.008
2.65†	0.331	0.364	0.397	0.319	0.351	0.382	0.258	0.284	0.310	+0.006	+0.007	+0.008	0.000	0.000	0.000

* Density at 0°C, see "Density of Weights," p. 75

† Density at 20°C, see "Density of Weights," p. 75

If also $\rho_a'' = \rho_a' = \sigma$, as when the "empty" portion of the container is filled with air of the same density as the surrounding atmosphere, and the vapor of the "object" weighed is negligible or should be included in m,

$$m = (s'' - s') + (v_m - v_{s''-s'})\sigma \tag{8}$$

or

$$m = (s'' - s')\left(1 - \frac{\sigma}{\Delta}\right) + v_m\sigma = (s'' - s')\left(\frac{1 - \frac{\sigma}{\Delta}}{1 - \frac{\sigma}{\rho_m}}\right) \tag{8'}$$

In equations (8) and (8′) the effect of the container has been eliminated; the equation is of the form of equation (2), and the buoyancy reduction factor from Table 2 may be used.

If the container is exhausted[1] when weighed alone; and if, when the object is being weighed there is in the container only material whose mass should be part of m, then $a' = a'' = 0$ and instead of equations (8) and (8′) we have

$$m = (s'' - s') - v_{s''-s'}\,\sigma = (s'' - s')\left(1 - \frac{\sigma}{\Delta}\right) \tag{9}$$

In this case the buoyant effect of the air on the object weighed has been eliminated, and the ordinary buoyancy reduction factors or equations do not apply (*cf.* (2) and (3)); Table 2 can not be used.

CORRECTING DENSITY DETERMINATIONS FOR THE BUOYANT EFFECT OF THE AIR

Correcting "Apparent" Values.—Radical differences in the constancy of temperatures or air densities, or such differences as that between equations (8) and (9) above, make it impossible to develop any single correction formula for correcting what are often called "apparent" values of specific gravity, or of density—values which have been determined without proper correction for the buoyant effect of the air. Such values can, however, be corrected in so far as the method and conditions of their determination are known.

Limitations.—In general: (1) It is impossible to correct each weighing on which the determination depends, because some unknown mass, volume, or density will generally be needed in order to find the volume of the air displaced. In some cases, however, approximate values may be known with sufficient accuracy for this purpose.

(2) Some special experimental requirements are always involved. Among these may be equal temperatures for two operations, constant volumes (*e.g.*, of pyknometer), negligible changes in the density of the air, etc., or a combination of several of them. A variety of combinations of such requirements may be used, each having its peculiar advantages, and each leading to a different equation.

(3) If the number of experimental requirements is made very small, the resulting equation for true density is very complex. Simplification of the final solution can be accomplished only by increasing the experimental requirements or by introducing approximations into the solution.

No method can be selected as "best."[1] Hence, the material given here is limited to the general fundamental equations, and to the exact solutions for certain cases that are of wide applicability in work of moderate precision. From these it is possible to arrange procedures suited to many different conditions, and to determine the accuracy of the corresponding solutions, and the effects of different errors under various circumstances.

In every case, ρ_m is obtained in the same units as those in which ρ_w is expressed. For the purposes of the following equations, σ may, in general, be expressed either as g/cm³ or as g/ml.

Density of Gases.—The general equations for weighing gases are the same as those for pyknometer determinations of liquids, particularly those for cases in which the pyknometer is exhausted when weighed alone, as in equation (17).

Experimental Requirements.—All the following equations involve two general requirements: (1) That in any one weighing or other operation all objects involved are at the same temperature (in weighing, the temperature of the atmosphere is involved); and (2) that changes in pressure produce no change in any of the volumes; *e.g.*, the volume of the pyknometer or other container must not change when it is exhausted. In addition, each equation involves one or more of the following special requirements:

A. Mass of pyknometer and its counterpoise remains constant: $p' = p'' = p'''$ and $c' = c'' = c'''$.

B. Coefficient of expansion of counterpoise is the same as that of the pyknometer: $\beta_p = \beta_c$. This makes b the same for all weighings.

C. Temperature at which pyknometer is filled is the same for the material being studied as for the calibrating liquid. Therefore $w'' = \rho_w v_t$ and $l''' = \rho_l v_t$.

D. Temperature for all three weighings is the same as that at which the pyknometer is filled. This results in all volumes being constant, in $v_w'' = v_l''' = v'' = v'''$, in $a'' = a''' = 0$, and in the density of each material being constant.

E. Density of the atmosphere the same for all three weighings: $\sigma' = \sigma'' = \sigma'''$.

F. Density of the weights the same in all weighings. This demands that the temperature be the same for all three weighings. *See also* p. 75.

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[1] As v, is assumed to remain constant, pressure effects must be suitably eliminated.

[1] The advantages and disadvantages of different experimental arrangements, such as the size and mass of the counterpoise used, or the temperature control, do not depend on the form of solution of the equations so much as on the effect of variations and errors that are *not* shown in the fundamental equations.

G. **Density of air or other material in the "empty" portion of the pyknometer equal to that of the surrounding atmosphere:** $\rho_a' = \sigma'$, $\rho_a'' = \sigma''$, $\rho_a''' = \sigma'''$.

H. **Pyknometer evacuated when weighed empty.**

I. **Volume of counterpoise equal to "exterior" volume of pyknometer.** $v_c = v_e$.

J. **Volume of counterpoise equals that of the pyknometer itself, excluding the space that would be filled by liquid at the temperature of filling:** $v_c = v_p$.

Pyknometer Determinations.—(1) *Liquids.*—Three weighings are required, from which, under experimental requirement *A*, w'' and l''' are obtained directly by equation (6). Under requirement C, $\rho_l = \frac{l'''}{w''}\rho_w$.

Therefore under requirements *A* and *C*:

$$\rho_l = \frac{(s'''-s')-(a'''-a')+[v_e'''-(v_s'''+v_c''')]\sigma'''-[v_e'-(v_s'+v_c')]\sigma'}{(s''-s')-(a''-a')+[v_e''-(v_s''+v_c'')]\sigma''-[v_e'-(v_s'+v_c')]\sigma'}\rho_w \tag{10}$$

and

$$v_t = \frac{(s''-s')-(a''-a')+[v_e''-(v_s''+v_c'')]\sigma''-[v_e'-(v_s'+v_e')]\sigma'}{\rho_w} \tag{11}$$

Under requirement *B*, *b* may be introduced for $\frac{v_e - v_c}{v_e}$. If also a part of the buoyancy correction for each weighing is made by calculating s_e', s_e'', and s_e''', then the remaining buoyancy reduction terms can be combined and simplified. Then under requirements *A*, *B*, and *C* the equations may be put in the form

$$\rho_l = \frac{s_e'''-s_e'}{s_e''-s_e'}\left[\rho_w+\frac{a''-a'}{v_t}-\frac{b}{v_t}(v_s''\sigma''-v_s'\sigma')\right]-\frac{a'''-a'}{v_t} + \frac{b}{v_t}(v_s'''\sigma'''-v_s'\sigma') \tag{12}$$

and

$$v_t = \frac{(s_e''-s_e')-(a''-a')+b(v_s''\sigma''-v_s'\sigma')}{\rho_w} \tag{13}$$

Under the conditions noted, these equations are perfectly general. They do not involve any mathematical approximations in their derivation and therefore show the proper effect of each quantity. However, in using them, approximate data must, in general, be used, because v_e which is needed in computing v_t cannot be accurately known until after v_t has been computed. If a first approximation is not sufficiently accurate the accuracy may be increased by successive approximations.

{The values of v_e', v_e'' and v_e''' may be computed from the relation $v_e = v_p + v_t = \frac{p}{\rho_p} + \frac{w}{\rho_w}$, and if the capacity depends solely on temperature (and not on pressure or other factors),

$$v_e' = v_e[1 + \beta_p(t' - t)];\ v_e'' = v_e[1 + \beta_p(t'' - t)];$$
$$v_e''' = v_e[1 + \beta_p(t''' - t)] \tag{14}$$

The values of a', a'', and a''' may be computed from known values of ρ_a and the equations

$$\left.\begin{aligned} v_a' &= v' = v_t[1 + \beta_p(t' - t)] \\ v_a'' &= v'' - v_w'' = v_t(\beta_p - \beta_w)(t'' - t) \\ v_a''' &= v''' - v_l''' = v_t(\beta_p - \beta_l)(t''' - t) \end{aligned}\right\} \tag{15}$$

Under requirements *D*, *E*, *F*, and *G*, in addition to *A*, *B*, and *C*, (12) becomes

$$\rho_l = \frac{s''' - s'}{s'' - s'}(\rho_w - \sigma) + \sigma \tag{16}$$

And under requirement *H* in addition to *A*, *B*, *C*, *D*, *E*, *F*, and *G*

$$\rho_l = \frac{s''' - s'}{s'' - s'}\rho_w \tag{17}$$

As shown in equations (16) and (17), experimental requirements *A* to *G* inclusive render the results independent of the size or nature of the counterpoise and of the value of the density of the weights used, though these quantities must be the same for all observations. Including requirement *H* renders the results independent of the actual value of the density of the air also, but still requires that this value shall be the same for all three weighings.

Under requirement *I*, with *A*, *B*, and *C*, (10) becomes

$$\rho_l = \frac{(s_e''' - s_e') - (a''' - a')}{(s_e'' - s_e') - (a'' - a')}\rho_w \tag{18}$$

and its equivalent (12), and (13) become

$$\rho_l = \frac{s_e''' - s_e'}{s_e'' - s_e'}\left[\rho_w + \frac{a'' - a'}{v_t}\right] - \frac{a''' - a'}{v_t} \tag{19}$$

and

$$v_t = \frac{(s_e'' - s_e') - (a'' - a')}{\rho_w} \tag{20}$$

Under requirement *J*, with *A*, *B*, and *C*, (10) becomes

$$= \frac{(s''' - s') - (a''' - a') + [v''' - v_s''']\sigma''' - [v' - v_s']\sigma'}{(s'' - s') - (a'' - a') + [v'' - v_s'']\sigma'' - [v' - v_s']\sigma'}\rho_w \tag{21}$$

and its equivalent (12), and (13) become

$$\rho_l = \frac{s_e''' - s_e'}{s_e'' - s_e'}\left[\rho_w + \frac{a'' - a'}{v_t} - \frac{1}{v_t}(v''\sigma'' - v'\sigma')\right] - \frac{a''' - a'}{v_t} + \frac{1}{v_t}(v'''\sigma''' - v'\sigma') \tag{22}$$

and

$$v_t = \frac{(s_e'' - s_e') - (a'' - a') + v''\sigma'' - v'\sigma'}{\rho_w} \tag{23}$$

Pyknometer Determinations.—(2) *Solids.*—The following equations are based on two pyknometer weighings and a separate determination of the mass of the object. If the pyknometer is used as a container for weighing the object this requires two weighings. (*See* p. 76 to 78.)

The symbol $''$ refers to the weighing with the calibrating liquid alone; $'''$ to the weighing with both this liquid and the object being studied.

Under requirements *A* and *C* only,

$$\rho_m'' = \frac{m\rho_w''}{m - (s''' - s'') + (a''' - a'') - [v_e''' - v_s''' - v_c''']\sigma''' + [v_e'' - v_s'' - v_c'']\sigma''} \tag{24}$$

Under requirement *B*, in addition to *A* and *C*, equation (24) may be put into the form (25) by combining the terms in *s* with those in $v_s\sigma$.

$$\rho_m'' = \frac{m\rho_w''}{m - (s_e''' - s_e'') + (a''' - a'') - b(v_s'''\sigma''' - v_s''\sigma'')} \tag{25}$$

Under requirements *D* and *E*, in addition to *A*, *B*, and *C*,

$$\rho_m = \frac{m\rho_w}{m - (s_e''' - s_e'')} \tag{26}$$

This equation is independent of the magnitudes of σ, c, and v_c, merely requiring their constancy.

Hydrostatic Weighings for Density of Solids.—These equations are based on two weighings; one with the object in air and one with it suspended in a liquid (*e.g.*, water) of known density. The equilibrium equations for these weighings are

$$m' - v_m'\sigma' = s' - v_s'\sigma'$$

and

$$m'' - v_m''\rho_w'' = s'' - v_s''\sigma''$$

the notation being similar to that used for pyknometer weighings. If the mass of the object remains constant (*i.e.*, $m' = m''$), (27) is an exact solution of these equations.

$$\rho_m' = \frac{s_e'}{s_e' - s_e''}(\rho_w''[1 + \beta_m(t'' - t')] - \sigma') + \sigma' \tag{27}$$

If also all temperatures, the air density, and the density of the weights are the same in the two weighings,

$$\rho_m = \frac{s'}{s' - s''}(\rho_w - \sigma) + \sigma \tag{28}$$

Correction Formula.—When the result of a density determination is calculated without any correction for the buoyant effect of the air, a false value (ρ_f) is obtained except for pyknometer determinations in which the conditions of the work are those specified for equation (17)

If for pyknometer determinations, these false values were computed by means of the equation $\rho_f = \frac{s''' - s'}{s'' - s'}\rho_w$ and for hydrostatic weighings of solids by means of the equation $\rho_f = \frac{s'}{s' - s''}\rho_w$, then to the precision attainable by assuming that the conditions were those specified for equations (16) or (28) the values may be corrected by the equation

$$\rho = \rho_f\left(1 - \frac{\sigma}{\rho_w}\right) + \sigma \tag{29}$$

VOLUME OF A MASS OF LIQUID OF KNOWN WEIGHT IN AIR

(See also p. 73)

VERNEY STOTT AND PHILIP H. BIGG

Symbols. $F = \frac{1 - \frac{\sigma}{\Delta}}{\rho - \sigma}$; t = temperature of the liquid when its volume is V; t_o = temperature of the liquid when weighed; V = volume of the liquid at temperature t; W = weight of the liquid in air against weights of density Δ; ρ, ρ_o = density of the liquid at $t°$ and at $t_o°$, respectively; σ = density of air at time of weighing.

If densities are expressed in g/cm³, and W in g, V is in cm³; if densities are in g/ml and W in g, V is in ml; if densities are in lb./gal., and W in lb., V is in gal.; etc.

The exact relations connecting these quantities are given by the equation

$$V = \frac{W}{\rho}\left(\frac{1 - \frac{\sigma}{\Delta}}{1 - \frac{\sigma}{\rho_o}}\right) = \frac{W}{\rho}\left(\frac{1 - \frac{\sigma}{\Delta}}{1 - \frac{\sigma}{\rho}}\right)\left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_o}}\right) = FW\left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_o}}\right)$$

VALUES OF F FOR WATER AND MERCURY

(Liquids are air-free)

$$V = FW\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_o}}$$

In many cases the factor $\left(\frac{1 - \frac{\sigma}{\rho}}{1 - \frac{\sigma}{\rho_o}}\right)$ does not differ significantly from unity. If t_o = 20°C, the greatest value of this factor for the temperature range covered by the following table differs from unity by only 7.3×10^{-6} for water and by 0.48×10^{-6} for mercury.

If $t_o = t$, $V = FW$. For water, $F = 1 + 0.001\,K_{H_2O}$; for mercury, $F = 0.07 + 0.001\,K_{Hg}$

Unit of F = milliliter per g of W; of t = °C. Assumes* σ = 0.0012 g/ml; Δ = 8.3 g/ml.

t	K_{H_2O}	K_{Hg}	t	K_{H_2O}	K_{Hg}	t	K_{H_2O}	K_{Hg}	t	K_{H_2O}	K_{Hg}	t	K_{H_2O}	K_{Hg}
0	1.189	3.550	10	1.330	3.683	20	2.832	3.817	30	5.410	3.951	40	8.890	4.085
1	1.130	3.563	11	1.425	3.697	21	3.044	3.830	31	5.720	3.964	41		4.098
2	1.089	3.576	12	1.533	3.710	22	3.267	3.844	32	6.038	3.977	42		4.111
3	1.065	3.590	13	1.654	3.723	23	3.501	3.857	33	6.366	3.991	43		4.125
4	1.057	3.603	14	1.788	3.737	24	3.744	3.870	34	6.702	4.004	44		4.138
5	1.065	3.616	15	1.933	3.750	25	3.998	3.884	35	7.046	4.018	45		4.152
6	1.089	3.630	16	2.090	3.763	26	4.261	3.897	36	7.399	4.031	46		4.165
7	1.127	3.643	17	2.259	3.777	27	4.534	3.910	37	7.760	4.044	47		4.178
8	1.181	3.656	18	2.438	3.790	28	4.817	3.924	38	8.129	4.058	48		4.192
9	1.248	3.670	19	2.630	3.803	29	5.109	3.937	39	8.505	4.071	49		4.205
												50		4.219

* The increase (dK) produced in K by changing Δ to $\Delta(1 + \delta)$ and σ to $\sigma(1 + s)$ is closely given (± *ca* 1 %) for the range of this table by the equations:

$$dK_{H_2O} = 0.145(7.3s + 0.997\delta + 8.3s\delta)\frac{1}{1 + \delta}$$

$$dK_{Hg} = 0.00078(-5.3s + 13.6\delta + 8.3s\delta)\frac{1}{1 + \delta},$$

units being those of this table. For uncertainties in σ, and for the variation of σ with pressure, temperature, and humidity, see p. 78. When brass weights are not used, δ will, in general, be large; in such cases it is desirable to transform the equations once for all by inserting the proper value for δ; they will take the convenient form $dK = a + bs$. If $\delta = 0$, $dK_{H_2O} = 1.06s$, $dK_{Hg} = 0.00414s$. If $s = 0$, $dK_{H_2O} = 0.145\frac{\delta}{1 + \delta}$; $dK_{Hg} = 0.0106\frac{\delta}{1 + \delta}$.

Example.—(1) If $\sigma = 0.00132$ and $\Delta = 8.383$, $s = 0.1$, $\delta = 0.01$ and $dK_{H_2O} = 0.145(0.73 + 0.01 + 0.008)\frac{1}{1.01} = 0.144(0.75) = 0.108$. Hence, if t = 19°C, $K_{H_2O} = 2.63 + 0.108 = 2.74$.

(2) If $\sigma = 0.00132$ and $\Delta = 2.65$ (quartz), $s = 0.1$, $(1 + \delta) = \frac{2.65}{8.3}$, $\delta = -\frac{5.65}{8.3}$, and $dK_{Hg} = 0.00078(-0.53 - 9.26 - 0.565)(3.13) = -0.0253$. Hence, if t = 25°C, $K_{Hg} = 3.884 - 0.025 = 3.859$.

STANDARD BUFFER SOLUTIONS AND ACID-BASE INDICATORS

Mansfield Clark

In the following tables pH represents (formalistically) $\log_{10} \frac{1}{[H^+]}$ where $[H^+]$ is the symbol for grams of hydrogen ions per liter. Since there is a disagreement concerning the precise interpretation of experimental values, the experimental meaning of pH is defined by the set of conditions described below (8, 57).

The normal hydrogen-electrode is regarded as a properly coated, noble metal, under one atmosphere partial-pressure of hydrogen, immersed in a solution normal with respect to hydrogen ions. The difference of potential between electrode and solution is regarded as zero at all temperatures.

The following values are regarded as *standard* differences of potential (E_c) (liquid-junction potential-difference being eliminated) between the tenth-normal KCl—Hg_2Cl_2—Hg half-cell and the hypothetical, normal hydrogen-electrode.

$T°$	18	20	25	30	37.5	40	50	60
E_c	0.3380	0.3379	0.3376	0.3372	0.3364	0.3360	0.3341	0.3317

For present purposes it is assumed that the liquid-junction potential-difference between an Hg_2Cl_2 half-cell solution and the solution the pH of which is under measurement has been eliminated when there has been interposed a saturated solution of KCl, or when there has been employed the Bjerrum extrapolation (4) from measurements made with 3.5N KCl and 1.75N KCl as interposed solutions.

When the electromotive force, e.m.f., of the "chain",

$$\mathrm{H_2Pt} \;\Big|\; [\mathrm{H^+}] \;\Big|\; \underset{\text{saturated}}{\mathrm{KCl}} \;\Big|\; \underset{0.1N}{\mathrm{KCl}} \;\Big|\; \mathrm{Hg_2Cl_2Hg}$$

is measured under the above conditions, and the Hg is positive to the Pt, pH is calculated from the equation

$$\frac{\text{E.M.F.} - E_c}{0.000\,198\,37(273.09 + t)} = \text{pH}.$$

(See (8, 37, 45, 64) and references therein on potentiometric measurement of pH.)

The chief modes of employing indicators for the determination of pH may be illustrated by the following examples.

I. A solution having been found to induce a blue color with brom thymol blue (see No. 139, Table 3A), a yellow color with thymol blue (No. 129), and a color intermediate between yellow and red with phenol red (No. 142) is judged to have a pH value between 7.0 and 7.8. Then to 10 ± 0.05 cc of solution are added 5 drops 0.04% phenol red solution (made by dissolving 0.1 g phenol red in 28.5 cc 0.01N NaOH solution and diluting to 250 cc). The resulting mixture is then compared with standards made by adding 5 drops of the same phenol red solution to each of 10 ± 0.05 cc portions of buffers having pH values of 7.0, 7.2, 7.4, 7.6, etc. (See Table 1A.)

The comparison is made in containers of identical dimensions and under uniform illumination. It is found that the tested solution has a color intermediate and half-way between those of buffers 7.4 and 7.6, and since the total salt contents of the tested solution and of the buffers are of the same order of magnitude, and since the solution contains no protein or substance known to affect the indicator, 7.5 is judged to be the true pH value of the tested solution (8, 11, 31, 37, 45, 53, 54, 56).

II. A solution is found to induce a partial color transformation of phenol red. Using uniform containers (*e.g.*, test tubes) there are prepared:

(1) A mixture of 10 ± 0.05 cc solution under test and 10 drops standard phenol red solution (see I).

(2) A mixture of x drops of indicator and sufficient buffer solution of the value shown in column B of Table 3A to equal the total volume of solution 1.

(3) A mixture of $10 - x$ drops of indicator and sufficient buffer of the value shown in column C of Table 3A to equal the total volume of solution 1.

X is varied and there is found at $x = 4$ a match in color between solution 1 and superposed solutions 2 and 3. From the relation: $\text{pH} = \text{pK} + \log \frac{x}{10 - x}$, and the value 7.8 for pK given in Table 3A it is calculated that the value of the tested solution is 7.6 (see in addition to the general references under I (2, 19, 20, 22, 34, 63).

III. A solution is found to induce a partial color-transformation in m-nitrophenol (No. 15, Table 3C). It is found that 10 cc of the tested solution plus 1 cc of 0.3% m-nitrophenol matches in color 11 cc of an alkalinized solution containing 0.2 cc of 0.3% m-nitrophenol. It is thus shown that the tested solution has induced a 20% transformation. If a is the percentage transformation of the indicator, pH is calculated from

$$\text{pH} = \text{pK} + \log \frac{a}{100 - a}$$

In the case at hand $a = 20$, the temperature of the measurement was 25° and the total salt content of the solution was of the order of magnitude of 0.15M. Hence from Table 3C, pK is taken as 8.16. By the above equation pH = 7.56.

The equation $\text{pH} = \text{pK} + \log \frac{a}{100 - a}$ cannot be used with picric acid, phenolphthalein or Alizarine yellow GG listed in Table 3C, since these indicators do not behave as monoacidic within the range of pH specified. Empirical data (38) for phenolphthalein and Alizarine yellow GG are shown in Table 4. It is best to vary the amounts of indicator used till the most favorable color-differences are found. (In addition to the material found in the general references under I see (30, 31, 38, 39) for method III.)

pK in the tables represents the pH at which there is an apparent half-transformation of the indicator. For indicators behaving as monoacidic or monobasic, within the zone of pH designated, pK is log 1/Ka when Ka is the "apparent dissociation constant" (43). When an indicator, such as phenolphthalein, is known not to behave as monoacidic within the range of pH designated, pK is bracketed.

pK values listed in Tables 3A and 3C are uniform with respect to the bases of reference. Those of the indicators in the general list (Table 2) are referred to such a variety of bases that tabulation is impracticable. The reader is therefore referred to original articles (8, 31, 37, 43, 45, 51, 58, 59, 60, 61, 67).)

The values assigned to useful pH ranges are somewhat arbitrary, depending upon concentration of indicator, the spectral distribution of illumination, and psychological preferences.

Indicator solutions are affected to various degrees by

a. Total salt content.

b. Specific ions: *e.g.*, alizarine red S is affected by borates differently than by phosphates (67).

c. Colloidal suspensions, protein solutions, etc.: *e.g.*, congo red in a gelatine solution of pH 3.6 behaved as if the pH were 5.6 (53). Neutral red in soap solutions forms a fatty acid complex (27).

d. Presence of immiscible solvents: *e.g.*, chloroform used for disinfection removes benzene-azo-benzyl-aniline from the aqueous phase (53).

e. **Mixed solvents and change of solvent** (3, 31, 32, 40, 62).

f. **Temperature.** See Table 3A, 3C.

g. **Time:** *e.g.*, water blue changes color slowly and propyl red precipitates

h. **Destructive agents:** *e.g.*, methyl red is irreversibly reduced in some bacterial cultures.

Since it is impracticable to tabulate all available data, only representative "salt" and temperature effects are given in Tables 3A, 3B and 4.

The indicators of Table 3 include the better of those which may be used in acidimetric and alkalimetric titration. (For principles see (5, 31, 43, 45).)

TABLE 1.—STANDARD BUFFER SOLUTIONS

The following tables give the compositions of solutions which furnish, at the temperatures indicated, values of pH which conform in essential respects to the specifications listed in the general notes above. Recalculation to make the conformity rigid would involve changes in the original data which would be less than the uncertainties of the working standards used in the experiments. The solutions listed may serve as standards for the colorimetric measurements of pH. The solutions suffer relatively slight displacement of pH with addition or subtraction of small proportions of acid or alkali. This property is referred to as that of a *buffer* (*puffer, tampon*). (For buffer solutions see (8, 37, 45, 64).)

A. STANDARD BUFFER SOLUTIONS OF CLARK AND LUBS (10) AT 20°

50 cc A + *x* cc B diluted to 200 cc

A = 0.2*M* KCl* B = 0.2*M* HCl		A = 0.2*M* KH *o*-phthalate B = 0.2*M* HCl		A = 0.2*M* KH *o*-phthalate B = 0.2*M* NaOH		A = 0.2*M* KH_2PO_4 B = 0.2*M* NaOH		A = 0.2*M* H_3BO_3† + 0.2*M* KCl B = 0.2*M* NaOH	
pH	cc B	pH	cc B	pH	cc B	pH	cc B	pH	cc B
1.2	64.5	2.2	46.70	4.0	0.40	5.8	3.72	7.8	2.61
1.4	41.5	2.4	39.60	4.2	3.70	6.0	5.70	8.0	3.97
1.6	26.3	2.6	32.95	4.4	7.50	6.2	8.60	8.2	5.90
1.8	16.6	2.8	26.42	4.6	12.15	6.4	12.60	8.4	8.50
2.0	10.6	3.0	20.32	4.8	17.70	6.6	17.80	8.6	12.00
2.2	6.7	3.2	14.70	5.0	23.85	6.8	23.65	8.8	16.30
		3.4	9.90	5.2	29.95	7.0	29.63	9.0	21.30
		3.6	5.97	5.4	35.45	7.2	35.00	9.2	26.70
		3.8	2.63	5.6	39.85	7.4	39.50	9.4	32.00
				5.8	43.00	7.6	42.80	9.6	36.85
				6.0	45.45	7.8	45.20	9.8	40.80
				6.2	47.00	8.0	46.80	10.0	43.90

B. SØRENSEN'S GLYCOCOLL-NACL-HCL MIXTURES(56)

Glycocoll solution: 0.1*M* Glycocoll + 0.1*M* NaCl per l; HCl 0.1*N*. Values hold between 10°-70° (66)

Glycocoll (cc)	0.0	1.0	2.0	3.0	4.0	5.0
HCl (cc)	10.0	9.0	8.0	7.0	6.0	5.0
pH	1.04	1.15	1.25	1.42	1.65	1.93

Glycocoll (cc)		6.0	7.0	8.0	9.0	9.5
HCl (cc)		4.0	3.0	2.0	1.0	0.5
pH		2.28	2.61	2.92	3.34	3.68

C. SØRENSEN'S CITRATE-HCL MIXTURES (56)

Citrate solution: **21.008** g crystn. citric acid + 200 cc *N* NaOH per l; HCl: **0.1*N***. Values hold between 10°-70° (66)

Citrate (cc)....	0.0	1.0	2.0	3.0	3.33	4.0	4.5	4.75	5.0	5.5	6.0	7.0	8.0	9.0	9.5	10.0
HCl (cc)......	10.0	9.0	8.0	7.0	6.67	6.0	5.5	5.25	5.0	4.5	4.0	3.0	2.0	1.0	0.5	0.0
pH	1.04	1.17	1.42	1.93	2.27	2.97	3.36	3.53	3.69	3.95	4.16	4.45	4.65	4.83	4.89	4.96

D. SØRENSEN'S PHOSPHATE MIXTURES (55, 56)

9.078 g KH_2PO_4, 11.876 g $Na_2HPO_4.2H_2O$ each per l. Values hold between 10°-70° (66).

Na_2HPO_4 (cc)	0.25	0.5	1.0	2.0	3.0	4.0
KH_2PO_4 (cc)	9.75	9.5	9.0	8.0	7.0	6.0
pH	5.29	5.59	5.91	6.24	6.47	6.64

Na_2HPO_4 (cc)	5.0	6.0	7.0	8.0	9.0	9.5
KH_2PO_4 (cc)	5.0	4.0	3.0	2.0	1.0	0.5
pH	6.81	6.98	7.17	7.38	7.73	8.04

E. SØRENSEN'S CITRATE-NAOH MIXTURES (56); WALBUM'S VALUES (66)

Citrate solution; 21.008 g crystn. citric acid + 200 cc *N* NaOH per l; NaOH: 0.1*N*

Volume parts		Temperature						
Citrate	NaOH	10°	20°	30°	40°	50°	60°	70°
10.0	0.0	4.93	4.96	5.00	5.04	5.07	5.10	5.14
9.5	0.5	4.99	5.02	5.06	5.10	5.13	5.16	5.20
9.0	1.0	5.08	5.11	5.15	5.19	5.22	5.25	5.29
8.0	2.0	5.27	5.31	5.35	5.39	5.42	5.45	5.49
7.0	3.0	5.53	5.57	5.60	5.64	5.67	5.71	5.75
6.0	4.0	5.94	5.98	6.01	6.04	6.08	6.12	6.15
5.5	4.5	6.30	6.34	6.37	6.41	6.44	6.47	6.51
5.25	4.75	6.65	6.69	6.72	6.76	6.79	6.83	6.86

F. SØRENSEN'S BORATE-HCL MIXTURES (56); WALBUM'S VALUES (66)

Borate: 12.404 g H_3BO_3 + 100 cc *N* NaOH per l; HCl: 0.1*N*

Volume parts		Temperature						
Borate	HCl	10°	20°	30°	40°	50°	60°	70°
10.0	0.0	9.30	9.23	9.15	9.08	9.00	8.93	8.86
9.5	0.5	9.22	9.15	9.08	9.01	8.94	8.87	8.80
9.0	1.0	9.14	9.07	9.01	8.94	8.87	8.80	8.74
8.5	1.5	9.06	8.99	8.92	8.86	8.80	8.73	8.67
8.0	2.0	8.96	8.89	8.83	8.77	8.71	8.65	8.59
7.5	2.5	8.84	8.79	8.72	8.67	8.61	8.55	8.50
7.0	3.0	8.72	8.67	8.61	8.56	8.50	8.45	8.40
6.5	3.5	8.54	8.49	8.44	8.40	8.35	8.30	8.26
6.0	4.0	8.32	8.27	8.23	8.19	8.15	8.11	8.08
5.75	4.25	8.17	8.13	8.09	8.06	8.02	7.98	7.95
5.5	4.5	7.96	7.93	7.89	7.86	7.82	7.79	7.76
5.25	4.75	7.64	7.61	7.58	7.55	7.52	7.49	7.47

H. SØRENSEN'S BORATE-NAOH MIXTURES (56); WALBUM'S VALUES (66)

Borate: 12.404 g H_3BO_3 + 100 cc *N* NaOH per 1; NaOH: 0.1*N*

Volume parts		Temperature							
Borate	NaOH	10°	14°	18°	22°	26°	30°	34°	37°
10	0.0	9.30	9.27	9.24	9.21	9.18	9.15	9.13	9.11
9	1	9.42	9.39	9.36	9.33	9.29	9.26	9.23	9.20
8	2	9.57	9.54	9.50	9.46	9.43	9.39	9.35	9.32
7	3	9.76	9.72	9.68	9.63	9.59	9.55	9.50	9.47
6	4	10.06	10.02	9.97	9.91	9.86	9.80	9.75	9.71
5	5	11.24	11.16	11.08	10.99	10.91	10.82	10.74	10.68
4	6	12.64	12.51	12.38	12.25	12.13	12.00	11.87	11.77

Continued on p. 84

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* The pH values of these mixtures are given by Clark and Lubs as *preliminary* measurements

† The old atomic weight (11.0) of boron is used throughout these tables

G. SØRENSEN'S GLYCOCOLL-NACL-NAOH MIXTURES (86); WALBUM'S VALUES (86)

Glycocoll: 7.505 g glycocoll + 5.85 g NaCl per l; NaOH: 0.1N

Volume parts		Temperature														
Glycocoll	NaOH	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	37°	40°
9.5	0.5	8.75	8.70	8.66	8.62	8.58	8.53	8.49	8.45	8.40	8.37	8.32	8.28	8.24	8.18	8.12
9.0	1.0	9.10	9.06	9.02	8.97	8.93	8.88	8.84	8.79	8.75	8.71	8.67	8.62	8.58	8.52	8.45
8.0	2.0	9.54	9.50	9.45	9.40	9.36	9.31	9.26	9.22	9.17	9.13	9.08	9.04	9.00	8.92	8.85
7.0	3.0	9.90	9.85	9.80	9.75	9.71	9.66	9.61	9.56	9.51	9.46	9.42	9.37	9.32	9.25	9.18
6.0	4.0	10.34	10.29	10.24	10.18	10.14	10.09	10.03	9.98	9.93	9.88	9.83	9.78	9.73	9.66	9.58
5.5	4.5	10.68	10.63	10.58	10.53	10.48	10.42	10.37	10.32	10.27	10.22	10.17	10.12	10.07	9.99	9.91
5.1	4.9	11.29	11.24	11.18	11.12	11.07	11.01	10.96	10.90	10.85	10.79	10.74	10.68	10.62	10.54	10.46
5.0	5.0	11.53	11.48	11.42	11.36	11.31	11.25	11.20	11.14	11.09	11.03	10.97	10.92	10.86	10.78	10.70
4.9	5.1	11.80	11.74	11.68	11.62	11.57	11.51	11.45	11.39	11.33	11.27	11.22	11.16	11.10	11.02	10.93
4.5	5.5	12.34	12.28	12.22	12.16	12.10	12.04	11.98	11.92	11.86	11.80	11.74	11.68	11.62	11.53	11.44
4.0	6.0	12.65	12.59	12.52	12.46	12.40	12.33	12.27	12.21	12.15	12.09	12.03	11.96	11.90	11.81	11.72
3.0	7.0	12.92	12.86	12.80	12.73	12.67	12.60	12.54	12.48	12.42	12.35	12.29	12.23	12.17	12.07	11.98
2.0	8.0	13.12	13.06	12.99	12.92	12.86	12.79	12.73	12.66	12.60	12.53	12.47	12.41	12.34	12.25	12.15
1.0	9.0	13.23	13.16	13.09	13.03	12.97	12.90	12.83	12.77	12.70	12.64	12.57	12.51	12.45	12.35	12.25

Volume parts		Temperature														
Glycocoll	NaOH	42°	44°	46°	48°	50°	52°	54°	56°	58°	60°	62°	64°	66°	68°	70°
9.5	0.5	8.07	8.03	7.99	7.95	7.91	7.86	7.82	7.78	7.74	7.69	7.65	7.61	7.56	7.52	7.48
9.0	1.0	8.41	8.37	8.32	8.28	8.24	8.19	8.14	8.10	8.06	8.02	7.97	7.93	7.88	7.84	7.79
8.0	2.0	8.81	8.76	8.72	8.67	8.63	8.58	8.53	8.49	8.44	8.40	8.35	8.30	8.26	8.21	8.16
7.0	3.0	9.13	9.08	9.03	8.99	8.94	8.89	8.84	8.79	8.74	8.70	8.65	8.60	8.55	8.50	8.45
6.0	4.0	9.53	9.48	9.43	9.38	9.33	9.28	9.23	9.18	9.13	9.08	9.03	8.98	8.93	8.88	8.82
5.5	4.5	9.86	9.81	9.76	9.71	9.66	9.61	9.56	9.51	9.46	9.41	9.35	9.30	9.25	9.20	9.15
5.1	4.9	10.40	10.35	10.29	10.24	10.18	10.13	10.07	10.02	9.96	9.90	9.85	9.79	9.74	9.68	9.62
5.0	5.0	10.64	10.59	10.54	10.48	10.43	10.37	10.32	10.26	10.20	10.14	10.09	10.04	9.98	9.93	9.87
4.9	5.1	10.87	10.81	10.75	10.69	10.64	10.58	10.52	10.46	10.40	10.35	10.29	10.23	10.17	10.11	10.05
4.5	5.5	11.38	11.32	11.26	11.20	11.14	11.08	11.02	10.96	10.90	10.84	10.78	10.72	10.66	10.60	10.54
4.0	6.0	11.65	11.59	11.53	11.47	11.41	11.34	11.28	11.22	11.16	11.10	11.03	10.97	10.91	10.84	10.78
3.0	7.0	11.91	11.85	11.79	11.73	11.66	11.60	11.54	11.47	11.41	11.35	11.28	11.22	11.16	11.09	11.03
2.0	8.0	12.08	12.02	11.96	11.89	11.83	11.77	11.70	11.64	11.57	11.51	11.44	11.38	11.31	11.25	11.18
1.0	9.0	12.19	12.13	12.06	12.00	11.94	11.87	11.80	11.74	11.67	11.61	11.54	11.48	11.41	11.35	11.28

J. pH VALUES OF BORAX-BORATE MIXTURES AT 18°C AND "SALT-EFFECTS" FOR PHENOLPHTHALEIN AND α-NAPHTHOLPHTHALEIN PALITZSCH (44)

Borax solution: 19.108 g $Na_2B_4O_7.10H_2O$ in 1 l. Boric acid solution: 12.404 g H_3BO_3 + 2.925 g NaCl in 1 l

Standard solutions			True pH values of sea water containing S parts per 1000 salinity at color-match with standard										
Borax cc	Boric acid cc	pH	S = 36	S = 30	S = 26	S = 22	S = 18	S = 14	S = 10	S = 6	S = 4	S = 2	S = 1	
6.0	4.0	8.69	8.48	8.49	8.50	8.52	8.54	8.57	8.59	8.63	8.66	8.69	8.72	Phenolphthalein
5.5	4.5	8.60	8.39	8.40	8.41	8.43	8.45	8.48	8.50	8.54	8.57	8.60	8.63	
5.0	5.0	8.51	8.30	8.31	8.32	8.34	8.36	8.39	8.41	8.45	8.48	8.51	8.54	
4.5	5.5	8.41	8.20	8.21	8.22	8.24	8.26	8.29	8.31	8.35	8.38	8.41	8.44	
4.0	6.0	8.31	8.10	8.11	8.12	8.14	8.16	8.19	8.21	8.25	8.28	8.31	8.34	
3.5	6.5	8.20	7.99	8.00	8.01	8.03	8.05	8.08	8.10	8.14	8.17	8.20	8.23	
4.5	5.5	8.41	8.19	8.20	8.21	8.23	8.25	8.28	8.32	8.37	8.40	8.45	8.48	α-Naphtholphthalein
4.0	6.0	8.31	8.09	8.10	8.11	8.13	8.15	8.18	8.22	8.27	8.30	8.35	8.38	
3.5	6.5	8.20	7.98	7.99	8.00	8.02	8.04	8.07	8.11	8.16	8.19	8.24	8.27	
3.0	7.0	8.08	7.86	7.87	7.88	7.90	7.92	7.95	7.99	8.04	8.07	8.12	8.15	
2.5	7.5	7.94	7.72	7.73	7.74	7.76	7.78	7.81	7.85	7.90	7.93	7.98	8.01	
2.3	7.7	7.88	7.66	7.67	7.68	7.70	7.72	7.75	7.79	7.84	7.87	7.92	7.95	
2.0	8.0	7.78	7.56	7.57	7.58	7.60	7.62	7.65	7.69	7.74	7.77	7.82	7.85	
1.5	8.5	7.60	7.38	7.39	7.40	7.42	7.44	7.47	7.51	7.56	7.59	7.64	7.67	
1.0	9.0	7.36	7.14	7.15	7.16	7.18	7.20	7.23	7.27	7.32	7.35	7.40	7.43	
0.6	9.4	7.09	6.87	6.88	6.89	6.91	6.93	6.96	7.00	7.05	7.08	7.13	7.16	
0.3	9.7	6.77	6.55	6.56	6.57	6.59	6.61	6.64	6.68	6.73	6.76	6.81	6.84	

H. Sørensen's Borate-NaOH Mixtures.—(Continued)

Volume parts		Temperature							
Borate	NaOH	40°	44°	48°	52°	56°	60°	64°	70°
10	0.0	9.08	9.05	9.02	9.00	8.97	8.93	8.90	8.86
9	1	9.18	9.15	9.11	9.08	9.05	9.01	8.98	8.94
8	2	9.30	9.26	9.22	9.18	9.15	9.11	9.08	9.02
7	3	9.44	9.40	9.35	9.31	9.27	9.22	9.18	9.12
6	4	9.67	9.62	9.56	9.51	9.46	9.40	9.35	9.28
5	5	10.61	10.53	10.44	10.36	10.27	10.19	10.10	9.98
4	6	11.68	11.55	11.42	11.29	11.17	11.04	10.91	10.72

I. Acetic Acid-acetate Mixtures; Walpole's Values (Recalculated) (68)

CH_3CO_2H *M*. ...	0.185	0.176	0.164	0.147	0.126	0.102
CH_3CO_2Na *M*	0.015	0.024	0.036	0.053	0.074	0.098
pH	3.6	3.8	4.0	4.2	4.4	4.6
CH_3CO_2H *M* ..		0.080	0.059	0.042	0.029	0.019
CH_3CO_2Na *M* .		0.120	0.141	0.158	0.171	0.181
pH		4.8	5.0	5.2	5.4	5.6

TABLE 2.—GENERAL LIST OF INDICATORS

The following list of indicators includes all those for which data on the pH-ranges have been found. Many of the data of this table are to be regarded with caution, because in some cases the *names proposed are inadequate for complete identification, and in others names have been given to materials of uncertain composition* (8, 11, 31, 37, 45, 53, 54, 56, 64).

The Schultz (S......) and Rowe (R......) numbers are taken from the 1923 (52) *and 1924* (48) *editions, respectively, of these works. Delicate shades* of meaning in the color nomenclature have been avoided, as data regarding the purity of the compounds have often been lacking. The abbreviations used are as follows: b, blue; br, brown; c, colorless; f, fades; fl, fluorescent; g, green; o, orange; p, pink; pu, purple; r, red; v, violet; y, yellow. pK is the pH at which there is an apparent half-transformation of the indicator. * indicates that the indicator has been studied in sufficient detail to be used in supplementing the lists of Table 3.

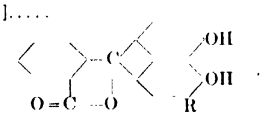
Nitro Compounds

Index No.	Indicator	Color and useful range pH	Lit.
1	2, 4, 6-Trinitrophenol; Picric acid [S. 5; R. 7]	c 0.0– 1.3 y	(31, 39)
2	2, 6-Dinitrophenol [Michaelis' *β*]	c 2.0– 4.0 y	(31, 38, 39)
3	2, 4-Dinitro-*α*-naphthol; Manchester yellow [S. 6; R. 9]	y 2.0– 4.0 y	(9)
4	2, 4-Dinitrophenol [Michaelis' *α*]	c 2.6– 4.4 y	(31, 38, 39)
5	Dinitrohydroquinol	3–10	(23, 46)
6	Nitrohydroquinol	3–11	(46)
7	2, 3-Dinitrophenol [Michaelis' *ε*]	c 3.9– 5.9 y	(31, 38, 39)
8	2, 5-Dinitrophenol [Michaelis' *γ*]	c 4.0– 5.8 y	(31, 38, 39)
9	2, 6-Dinitro-4-aminophenol; Isopicramic acid.	p 4.1– 5.6 y	(67)
10	3, 4-Dinitrophenol [Michaelis' *δ*]	c 4.3– 6.3 y	(38, 39)
11	4-Nitro-6-aminoguaiacol	y 4.5– 8.0 r	(35)
12	*p*-Nitrophenol	c 5.6– 7.6 y	(31, 38, 39, 56)
13	*o*-Nitrophenol	c 5.0– 7.0 y	(46)
14	*Dinitrobenzoylene urea	c 6.0– 8.0 y	(6)
15	*m*-Nitrophenol	c 6.8– 8.6 y	(31, 38, 39)
16	2, 4, 6-Trinitrophenyl-methyl-nitroamine; Nitramine	c 10.8–13.0 br	(31, 33)
17	*sym*.-Trinitrobenzene.	c 12.0–14.0 o; f	(50)
18	2, 4, 6-Trinitrotoluene	p 11.5–14.0 o	(9)
	Mono-azo Compounds		
19	*p*-Toluene-azo-phenyl-aniline	1.0– 2.0	(53, 54, 56)
20	*p*-Carboxybenzene-azo-dimethylaniline; Para methyl red	r 1.0– 3.0 y	(9, 60)
21	*p*-Toluene-azo-phenyl-*α*-naphthylamine	1.1– 1.9	(53, 54, 56)
22	Benzene-azo-diphenylamine	p 1.2– 2.1 y	(56)
23	*m*-Benzenesulfonic acid-azo-diphenylamine; Metanil yellow [S. 134; R. 138]	r 1.2– 2.3 y	(56)
24	Benzene-azo-phenyl-*α*-naphthylamine	v 1.4– 2.6 o	(53, 54, 56)
25	*p*-Benzenesulfonic acid-azo-diphenylamine; Tropaeolin OO [S. 139; R. 143]	r 1.4– 2.6 y	(56, 60)
26	*o*-Toluene-azo-*o*-toluidine; Spirit yellow R [S. 68; R. 17]	1.4– 2.9	(53, 54, 56)
27	*p*-Toluene-azo-benzyl-*α*-naphthylamine.	1.6– 2.6	(53, 54, 56)
28	*p*-Toluene-azo-benzyl-aniline	1.6– 2.8	(53, 54, 56)
29	Benzene-azo-benzyl-*α*-naphthylamine. ..	1.9– 2.9	(53, 54, 56)
30	Benzene-azo-aniline; Amino-azo-benzene [S. 31; R. 15]	y 1.9– 3.3 y	(53, 54, 56, 60)
31	*p*-Benzenesulfonic acid-azo-aniline	r 1.9– 3.3 y	(52, 53, 54, 60)
32	*p*-Benzenesulfonic acid-azo-benzylaniline	r 1.9– 3.3 y	(56, 60)
33	*m*-Carboxybenzene-azo-dimethylaniline	r 2.0– 4.0 y	(11)
34	Benzene-azo-benzylaniline . . .	p 2.3– 3.3 y	(56)
35	*p*-Benzenesulfonic acid-azo-*m*-chlorodiethylaniline	r 2.6– 4.0 y	(56, 60)
36	*m*-Nitrobenzene-azo-*β*-naphthol-3, 6-disulfonic acid; Orange III [S. 47; R. 39]	r 2.6– 4.6 y	(9)
37	Benzene-azo-dimethylaniline; Topfer's indicator [S. 32; R. 19] ...	r 2.9– 4.0 y	(56, 60)
38	*o*-Carboxybenzene-azo-*α*-naphthylamine	r 2.9– 5.8 y	(61)
39	*p*-Benzenesulfonic acid-azo-*o*-toluidine	mid-point 2.9	(60)

MONO-AZO COMPOUNDS.—(*Continued*)

Index No.	Indicator	Color and useful range pH	Lit.
40	*p*-Benzenesulfonic acid-azo-*m*-xylidine	mid-point 2.9	(60)
41	*o*-Carboxybenzene-azo-diphenylamine	p 3.0–4.6 y	(11)
42	*p*-Benzenesulfonic acid-azo-methylaniline	r 3.1–4.2 y	(53, 54, 56, 60)
43	*p*-Benzenesulfonic acid-azo-ethyl aniline	r 3.1–4.4 y	(53, 54, 56, 60)
44	*p*-Benzenesulfonic acid-azo-dimethylaniline; Methyl orange [S. 138; R. 142]	r 3.1–4.4 y	(56, 60)
45	*p*-Benzenesulfonic acid-azo-diethylaniline; Ethyl orange	r 3.5–4.5 y	(53, 54, 56, 60)
46	*o*-Benzenesulfonic acid-azo-dimethylaniline	mid-point 3.5	(60)
47	*p*-Benzenesulfonic acid-azo-*m*-toluidine	mid-point 3.5	(60)
48	*p*-Benzenesulfonic acid-azo-*p*-xylidine	mid-point 3.6	(60)
49	**p*-Sulfo-*o*-methoxybenzene-azo-dimethyl-*α*-naphthylamine	b 3.5–4.9 o	(42)
50	*p*-Benzenesulfonic acid-azo-*α*-naphthylamine	r 3.5–5.7 y	(56, 61)
51	*p*-Benzenesulfonic acid-azo-phenyl-*α*-naphthylamine	v 3.5–6.5 o	(61)
52	*o*-Carboxybenzene-azo-phenyl-*α*-naphthylamine	v 3.5–6.5 o	(61)
53	Benzene-azo-*α*-naphthylamine	r 3.7–5.0 y	(56, 61)
54	*p*-Toluene-azo-*α*-naphthylamine	3.7–5.0	(53, 54, 56)
55	*o*-Carboxybenzene-azo-methylaniline	r 4.0–6.0 y	(11)
56	Benzene-azo-*m*-phenylenediamine; Chrysoidine [S. 33; R. 20]	o 4.0–7.0 y	(9)
57	*o*-Carboxybenzene-azo-ethylaniline	r 4.2–6.2 y	(11)
58	*o*-Carboxybenzene-azo-*n*-propylaniline	r 4.2–6.2 y	(11)
59	*o*-Carboxybenzene-azo-dimethylaniline; Methyl red [R. 211]	r 4.2–6.3 y	(11, 14, 56, 60)
60	*o*-Carboxybenzene-azo-diethylaniline; Ethyl red	r 4.4–6.2 y	(11, 60)
61	**o*-Carboxybenzene-azo-di-*n*-propylaniline; Propyl red	r 4.6–6.6 y	(11)
62	*o*-Carboxybenzene-azo-*m*-phenylenediamine	o 4.6–7.6 y	(9)
63	Benzene-azo-dimethyl-*α*-naphthylamine	4.8–5.5	(53, 54, 56)
64	*p*-Benzenesulfonic acid-azo-dimethyl-*α*-naphthylamine	r 5.0–5.7 o	(53, 54, 56, 61)
65	*o*-Carboxybenzene-azo-*α*-naphthylamine	p 5.6–7.0 y	(11)
66	*o*-Carboxybenzene-azo-(di or mono?)-amyl aniline	o 5.6–7.6 y	(11)
67	*o*-Carboxybenzene-azo-dimethyl-*α*-naphthylamine	r 5.6–7.6 o	(11, 61)
68	4-Sulfo-*α*-naphthalene-azo-*α*-naphthol; Naphthylamine brown [S. 160; R. 175]	o 6.0–8.4 p	(9)
69	Tropaeolin?	y 7.0–9.0 r	(50)
70	6-Sulfo-*α*-naphthol-1-azo-*m*-hydroxybenzoic acid	o 7.0–8.0 b v 12–13 r	(67)
71	Curcumine?	y 7.4–8.6 b	(31)
72	*p*-Benzenesulfonicacid-azo-*α*-naphthol; Tropaeolin OOO No. 1 [S. 144; R. 150]	y 7.6–8.9 p	(56)
73	*p*-Benzenesulfonicacid-azo-*β*-naphthol; Tropaeolin OOO No. 2 [S. 145; R. 151]	7.6–8.9(?)	(45)
74	*m*-Nitrobenzene-azo-salicylic acid; Alizarine yellow GG [S. 48; R. 36]	c(?)10.0–12.0 y	(38, 39)
75	*p*-Nitrobenzene-azo-salicylic acid; Alizarine yellow R [S. 58; R. 40]	y 10.0–12.1 y	(56)
76	*α*-Naphthylaminosulfonic acid-azo-*β*-naphthol; Red I [S. 161; R. 176]	10.5–12.1	(53, 54, 56)
77	*α*-Naphthalene-azo-*β*-naphthol-3, 6-disulfonic acid; Bordeaux B [S. 112; R. 88]	p 10.5–12.5 o	(9)
78	*p*-Benzenesulfonic acid-azo-resorcinol; Tropaeolin O [S. 143; R. 148]	y 11.1–12.7 o	(56)
79	Benzene-azo-*β*-naphthol-6, 8-disulfonic acid; Orange GG [S. 38; R. 27]	y 11.5–14.0 p	(9)
80	Crocein?	p 12.0–14.0 v	(50)
81	Helianthin (Grübler)?	o 11.0–12.0 r	(9)
82	Helianthin I?	o 11.0–13.0 r	(50)
83	Helianthin II?	y 13.0–14.0 v	(50)
84	Curcumein?	o 0.0–1.0 y y 13.0–15.0 g	(50)
	DIS-AZO COMPOUNDS		
85	Ditolyl-disazo-bis-*β*-naphthylamine-6-sulfonic acid; Benzopurpurin B [S. 365; R. 450]	b 0.3–1.0 v v 1.0–5.0 y y 12.0–14.0 r	(50)
86	Ditolyl-disazo-bis-*α*-naphthylamine-4-sulfonic acid; Benzopurpurin 4B [S. 363; R. 448]	v 1.3–4.0 r	(31)
87	Diphenyl-disazo-bis-*α*-naphthylamine-4-sulfonic acid; Congo red [S. 307; R. 370]	b 3.0–5.0 r	(50)
88	Ditolyl-disazo-bis-*α*-naphthol-4-sulfonic acid; Azo blue [S. 377; R. 463]	v 10.5–11.5 p	(9)
89	Curcumin W [Probably Rowe, 364 (21)]	mid-point 7.3 mid-point 7.6	(49) (18)

TRIPHENYLMETHANE DERIVATIVES

Index No.	Indicator	Color and useful range pH	Lit.
90	*Methylated pararosaniline; Crystal violet [S. 516; R. 681]*	g 0.0– 2.0 b	(9)
91	*p, p′-Tetramethyldiamino-triphenylcarbinol; Malachite green [S. 495; R. 657]*	y 0.0– 2.0 g b 11.5–14.0 f	(50)
92	*Hofmann's violet; Methylated rosanilines and pararosanilines [S. 514; R. 679]*	g 0.0– 2.0 b	(9)
93	*Tetraethyl-diamino-triphenyl-carbinol; Brilliant green [S. 499; R. 662]*	y 0.0– 2.6 g	(9)
94	*Heptamethylrosaniline; Iodine green [R. 686]*	y 0.0– 2.6 b	(9)
95	Hexaethylpararosaniline; Ethyl violet [S. 518; R. 682]	y 0.0– 3.6 b	(9)
96	Ethyl-hexamethyl-pararosaniline; Ethyl green [R. 685]	y 0.3– 2.0 b	(31)
97	Methyl violet 6B; Benzylated tetra- and pentamethyl-pararosaniline [S. 517; R. 683]	y 0.15– 3.2 v	(56)
98	Gentian violet; mixture	0.4– 2.7	(53, 54, 56)
99	Aniline red; Rosaniline and pararosaniline [S. 512; R. 677]	pu 1.2– 3 0 f	(9)
100	Red violet 5RS; Di- and tri-sulfonate of ethylrosaniline [S. 525; R. 693]	p 3.6– 6.0 c	(9)
101	Resazurin [R. 727 note]	o 3.8– 6.5 v	(31)
102	China blue [S. 539; R. 707]; Mixture	b 4.7– 7.0 c	(9)
103	Rosolic acid [S. 555; R. 724]; Mixture	br 6.9– 8 0 r	(56)
104	Alkali blue 4B [S. 536; R. 704]; Mixture	v 9.4–14 0 p	(9)
105	XL Soluble blue [S. 538; R. 706]; Mixture	b 10 0–13 0 p	(9)
106	Poirrier's blue	b 11.0–13.0 r	(8)
107	Acid fuchsin; Di- and tri-sulfonic acids of rosaniline and pararosaniline [S. 524; R. 692]	r 12 0–14 0 f	(50)
	PHTHALEINS AND RELATED COMPOUNDS		
108	Diethyl-*m*-amino-phenolphthalein; Rhodamine B [S. 573; R. 749]	o 0.1– 1 2 p	(9)
109	Pyrogallol-phthalein; Gallein [S. 599; R. 781]	variable 0–14	(50)
110	Tetrabromofluorescein; Eosine Y S [S. 587; R. 768]	y 0 – 3.0 fl	(9)
111	Erythrosin (iodeosin); Di- or tetra iodated fluorescein [S. 591, 592?; R. 772, 773?]	o 0.0– 3.6 fl	(9)
112	Phloxin red B.H. (Grübler)?	p 1.4– 3.6 r	(9)
113	Dihydroxyfluoran; Uranin (fluorescein) [S. 585; R. 766]	y 3.6– 5.6 fl	(9)
114	Dichlorofluorescein	y 4.0– 6.6 fl	(9)
115	*o*-*α*-Naphthol phthalein	y 8.9– 9 5g(f)	(17)
116	*p*-*α*-Naphthol phthalein	y 7 0– 9 0 b	(56)
117	Tetrabromophenol phthalein	c 8 0– 9 0 v	(45)
118	*o*-Cresoltetrachlorophthalein	c 8.5– 9 0 pu	(1)
119	*o*-Cresolphthalein	c 8 2– 9 8 r	(11, 14)
120	Phenolphthalein [R. 764]	c 8.3–10.0 r	(38, 39, 56)
121	*1, 2, 3-Xylenolphthalein	c 8.9–10.2 b	(17)
122	Thymolphthalein	c 9 3–10.5b(f)	(56)
123	Dibromo-dinitrofluorescein; Eosin BN [S. 590; R. 771]	p 10.5–14.0 y	(9)
124	R = SCH_3 	c 8.4–10.0 v	(25)
125	R = SC_4H_9	c 8 6– 9 8 v	(25)
126	R = SC_6H_5	c 9 0–10 0 v	(25)
	SULFONPHTHALEINS		
127	Catecholsulfonphthalein	p 0 2– 0 8 o y 4 0– 7.0 g v 8 5–10 2 b	(41)
128	*m*-Cresolsulfonphthalein; Metacresol purple	r 0 8– 2 4 y y 7.6– 9 2 pu	(11, 14)
129	Thymolsulfonphthalein; Thymol blue	r 1 2– 2 8 y y 8.0– 9 6 b	(11, 14)
130	Tetranitrophenolsulfonphthalein	2 8– 3 8?	(11)
131	Tetrabromophenolsulfonphthalein; Bromphenol blue	y 3.0– 4 6 b	(11, 14)
132	*Tetrachlorophenolsulfonphthalein	y 3 0– 4 6 b	(11)
133	*Dichloro-dibromo-phenol-sulfonphthalein; Brom-chlorphenol blue	y 3 2– 4 8 b	(14)
134	Tetrabromo-*m*-cresolsulfonphthalein; Bromcresol green	y 3 8– 5 4 b	(11, 14)
135	Dichlorophenolsulfonphthalein; Chlorphenol red	y 5 0– 6 6 r	(11, 14)
136	Dibromo-*o*-cresolsulfonphthalein; Bromcresol purple	y 5 2– 6 8 pu	(11, 14)
137	Dibromophenolsulfonphthalein; Bromphenol red	y 5 4– 7 0 r	(11, 14)
138	*Diiodophenolsulfonphthalein	y 5.7– 7 3 pu	(9)
139	Dibromothymolsulfonphthalein; Bromthymol blue	y 6 0– 7 6 b	(11, 14)
140	*Brom Xylenol Blue, dibrominated No. 145	y 6 0– 7 6 b	(11, 14)
141	Phenol-nitrosulfonphthalein	y 6.6– 8.4 pu	(11)

SULFONPHTHALEINS.—(*Continued*)

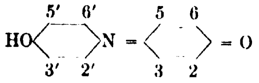
Index No.	Indicator	Color and useful range pH	Lit.
142	**Phenolsulfonphthalein; Phenol red**	y 6.8–8.4 r	(11, 14)
143	***o*-Cresolsulfonphthalein; Cresol red**	y 7.2–8.8 r	(11, 14)
144	**Salicylsulfonphthalein**	y 7.2–9.2 p	(9)
145	***1.4-Dimethyl-5-hydroxybenzenesulfonphthalein**; Xylenol blue	y 8.0–9.6 b	(12)
146	***α*-Naphtholsulfonphthalein**	y 7.5–9.0 b	(11)
147	**Carvacrolsulfonphthalein**	y 7.8–9.6 b	(11)
148	**Orcinsulfonphthalein**	y 8.6–10.0 fl	(11)
149	**Nitro-thymolsulfonphthalein**	v 9.2–11.5 y	(11)

QUINOLINE COMPOUNDS

Index No.	Indicator	Color and useful range pH	Lit.
150	*α*-(*p*-Dimethylaminophenylethylene)-quinoline ethiodide; Quinaldine red. Eastman Kodak Co. No. 1361	1.0–2.0	(36)
151	Quinoline blue (cyanin); 1, 1′ Disoamyl-4, 4′-quinocyanine iodide [S. 611; R. 806]	c 7.0–8.0 v	(52, 54, 56)

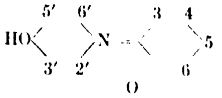
Index No. 152 INDOPHENOLS (15)

Color changes: from brownish or clear red in acid to deep blue in alkali. All indophenols are somewhat unstable



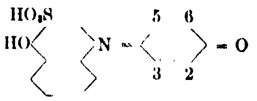
Indophenol

Substituents	pK
2, 6, 3′ Tribromo-	5.1
2, 6-Dibromo-3′-chloro-	5.4
2, 6-Dibromo-3′-methyl-	5.4
2, 6-Dichloro-3′-chloro-	5.8
2, 6-Dichloro-3′-methyl-	5.5
2, 6-Dibromo-3′-methoxy-	5.6
2, 6-Dichloro-	5.7
2, 6-Dibromo-	5.7
2, 6-Dibromo-2′-methyl-	5.9
2, 6-Dibromo-2′-bromo-	6.3
2-Chloro-	7.0
2-Bromo-	7.1
3-Bromo-	7.8
Indophenol	8.1
2-Methyl-	8.4
3-Methyl-	8.6
2-Methoxy-	8.7
2-Isopropyl-5-methyl-	8.8
2-Methyl-5-isopropyl	8.9



Orthoindophenol

Substituents	pK
3′ Bromo-	7.1
Orthoindophenol	8.4
2′-Methyl-	8.8



Indonaphthol-2′-sulfonic acid

Substituents	pK
2, 6 Dichloro-	6.1
Indonaphthol-2′-sulfonic acid	8.7
2-Methyl-	9.0

AZINES

Index No.	Indicator	Color and useful range pH	Lit.
153	Safranine (Which?)	b –0.3–1.0 r	(50)
154	Amino-dimethylamino-phenyl-diphenazonium chloride; Methylene violet B.N. [S. 680; R. 842]	pu 0.0–1.2 v	(9)
155	Amino-phenylamino-*p*-tolyl-ditolazonium sulphate; Mauve [S. 688; R. 846]	0.1–2.9	(56)
156	Magdala red; Mixture amino- and diamino-naphthyl-dinaphthazonium chlorides [S. 694; R. 857]	p 3.0–4.0 fl	(50)
157	Induline, spirit soluble [S. 697; R. 860]; Mixture	b 5.6–7.0 v	(9)
158	Amino-dimethylamino-toluphenazonium chloride; Neutral red [S. 670; R. 825]	r 6.8–8.0 y	(56)
159	Dimethylamino-phenyl-naphtho-phenazonium chloride; Neutral blue [S. 676; R. 832]	9.3–10.2	(52, 54, 56)

OXAZINE COMPOUNDS

Index No.	Indicator	Color and useful range pH	Lit.
160	Dihydroxy-dinaphthazoxonium sulfonate; Alizarin green B [S. 657; R. 918]	v –0.3–1.0 p y 12.0–14.0 br	(60)
161	Diethylamino-benzylamino-naphtho-phenazoxonium chloride; Nile blue 2B [S. 654; R. 914]	b 7.2–8.6 p	(9)
162	Diethylamino-aminonaphtho-phenazoxonium sulfate; Nile blue A [S. 653; R. 913]	b 10.2–13.0 p	(9)

ANTHRAQUINONE COMPOUNDS

Index No.	Indicator	Color and useful range pH	Lit.
163	1, 2-Dihydroxy-anthraquinone-β-quinoline; Alizarin blue ABI [S. 803; R. 1066]	p 0.0–1.6 y y 6.0–7.6 g	(9)
164	1, 2, 4-Trihydroxy-anthraquinone; Purpurin [S. 783; R. 1037]	y 0.0–4.0 o o 4.0–8.0 p	(9)
165	Alizarin sulfonic acid; Alizarin red S [S. 780; R. 1034]	y 3.7–4.2 p	(67)
166	1, 2-Dihydroxy-anthraquinone; Alizarin [S. 778; R. 1027]	y 5.5–6.8 r v 10.1–12.1 pu	(53, 54, 56)
167	Alizarin blue S	various 6–14	(45)

INDIGOS

Index No.	Indicator	Color and useful range pH	Lit.
168	Indigo disulfonate; Indigo carmine [S. 877; R. 1180]	b 11.6–14.0 y	(9)

MISCELLANEOUS AND NATURAL INDICATORS

Index No.	Indicator	Color and useful range pH	Lit.
169	Echtrot?	y 0 –1.0 r	(50)
170	Logwood [S. 938; R. 1246]	various 0–14	(45)
171	*Red cabbage extract	r 2.4–4.5 g	(65)
172	1-Oxynaphtho-quinomethane; Nierenstein's indicator	c 2.7–3.7 pu	(67)
173	Tröger and Hille's Indicator, $C_{14}H_{15}N_4SO_3H$	o 2.8–3.9 y	(67)
174	Phenacetolin	y 3.0–6.0 r r 10.0–13.0 c	(45)
175	Lacmosol	r 4.4–5.5 b	(26)
176	Lacmoid [R. 908 note]	r 4.4–6.2 b	(53, 54, 56)
177	Azolitmin (litmus) [R. 1242]	r 4.5–8.3 b	(53, 54, 56)
178	Cochineal [S. 932; R. 1239]	y 4.8–6.2 v	(53, 54, 56)
179	Archil (orchil) [S. 934; R. 1242]	p 5.6–7.6 v	(9)
180	Brazilein [S. 935; R. 1243]	c 6.0–8.0 p	(9)
181	Di-*o*-hydroxy-styryl ketone; Lygosine	y 7.3–8.7 g	(67)
182	Mimosa flower extract	7.7–9.6	(67)
183	Turmeric (curcuma) [S. 927; R. 1238]	y 7.8–9.2 br	(31)
184	Alkannin [R. 1240, note] *cf.* alizarin	8.3–10.0	(53, 54, 56)
185	α-Naphtholbenzein	y 8.5–9.8 g	(53, 54, 56)

COMMON SYNONYMS OF INDICATORS

Among synonyms given in this table are several which apply to dyes which are not listed in preceding table or which have been applied to two or more of the indicators listed. Such cases are indicated by*.

Acid bordeaux, 77
Acid brown R,* 68
Acid fuchsin,* 107
Acid magenta II, 107
Acid roseine, 107
Alizarin, 166
Alizarin blue ABI, 163
Alizarin blue S, 167
Alizarin blue X, 163
Alizarin carmine, 165
Alizarin green B, 160
Alizarin red S, 165
Alizarin sulfonate or S, 165
Alizarin yellow GG, 74
Alizarin yellow R, 75
Alkali blue 4B, 104
Alkanet, 184
Alkanin, Alkannin, 184
Alphanaphtholbenzein, 185
Alphanaphtholphthalein,* 116
Amido-azo-benzol, 30
Amido-azo-toluol, 26
Amino-azo-benzene, 30
Amino-azo-toluene, 26
Amyl red, 66
Anchusin, 184
Aniline orange,* 31
Aniline red, 99
Aniline yellow,* 3, 25, 30
Archil, 179
Aurin, 103
Azo blue, 88
Azolitmin, 177
Azoresorcin, 101
Benzopurpurin B, 85
Benzopurpurin 4B, 86
Benzyl violet, 97
Beta naphthol orange, 73
Bitter almond oil green, 91
Blauholz, 170
Boettger's indicator, 181
Bordeaux B, 77
Brasilein, brasilin, brazilin, 180
Brazil wood, 180
Brilliant green, 93
Brilliant yellow,* 89
Brom-chlor-phenol blue, 133
Brom cresol green, 134
Brom cresol purple, 136
Brom phenol blue, 131
Brom phenol red, 137
Brom thymol blue, 139
Brom xylenol blue, 140
Butter yellow,* 26, 37
Cabbage red, 171
Campeachy wood, 170
Carmine, 178
Carminic acid, 178
Catechol sulphonphthalein, 127
China blue, 102
Chlor phenol red, 135
Chrome printing orange R, 75
Chrome printing yellow G, 74
Chrysoidine,* 56
Chrysoine, 78
Coccus, 178
Cochenille, cochineal, 178
Congo, 87
Congo red, 87
Corallin, 103
Cresol red, 143
Cresolphthalein,* 119
Cresolsulphonphthalein,* 143
Crismer's indicator, 101
Crocein,* 80
Crystal violet, 90
Curcuma, 183
Curcumein,* 84
Curcumin,* 183
Curcumin W, 89
Curcummin,* 183
Cyanin, 151
Dechan's indicator, 109
Degener's indicator, 174
Diamil red,* 87
Dichlorofluorescein, 114
Diethylaniline orange, 45
Dihydroxyanthraquinone, 166
Dimethylaniline orange, 44
Dimethyl orange, 44
Dimethyl yellow, 37
Dinitroaminophenol, 9
Dinitrohydroquinone, 5
Echtrot,* 169
Echtrot A, 76
Echtrot B, 77
Eosine, 110
Eosine BN, 123
Eosine YS, 110
Erythrosine,* 111
Ethyl green,* 96
Ethyl orange, 45
Ethyl red,* 60
Ethyl violet, 95
Fast red A, 76
Fast red B,* 77
Fluorescein, 113
Formanek's indicator, 160
Fuchsia, 154
Fuchsin,* 99
Fuchsin S, 107
Galleine, 109
Gallein, 109
Gentian violet, 98
Golden orange, 44
Haematein,*[1] 170
Haematoxylin,*[1] haematoxylon,* 170
Helianthine,* 44, 81, 82, 83
Hematein,*[1] hematine,*[1] 170
Hematoxylin, *[1] 170
Henderson & Forbes' indicator, 5
Herzberg's indicator, 87
Hofmann's violet, 92
Holt & Reid's indicators, 124–126
Indigo carmine, 168
Indigo disulphonate, 168
Indophenols, 152
Induline spirit-soluble, 157
Iodeosine,* 111
Isopicramic acid, 9
Iodine green, 94
Kosmos red, 87

[1] Haematoxylin is the leuco-compound of Haematein or Hematine as obtained from logwood although the name is sometimes given to the oxidized form. Haematein or Hematine should not be confused with Hematin of the blood pigment.

Kroupa's indicator, 99
Krüger's indicator, 113
Lackmoid, lacmoid, 176
Lacmosol, 175
Lacmus, 177
Latmus, 177
Logwood, 170
Luck's indicator, 120
Lunge's indicator, 44
Lygosine, 181
McClendon's indicator, 11
Magdala red, 156
Magenta,* 99
Malachite green, 91
Manchester yellow, 3
Martius yellow, 3
Mauve, mauveine, 155
Mellet's indicator, 70
Meta cresol purple, 128
Meta methyl red, 33
Metanil yellow, 23
Metanitrophenol, 15
Methyl blue,* 105
Methylene violet BN, 154
Methyl green,* 96
Methyl orange, 41
Methyl red, 59
Methyl violet 5B or 6B, 97
Methyl yellow, 37
Michaelis' nitro indicators, 1, 2, 4, 7, 8, 10, 12, 15
Mimosa flower extract, 182
Moir's "Improved methyl orange," 49
Moir's polychromatic indicator, 127
Monobenzyl orange, 32
Monoethyl orange, 43
Monoethyl red, 57
Monomethyl orange, 42
Monomethyl red, 55
Monopropyl red, 58
Naphthol benzein, 185
Naphthol orange, 72
Naphtholphthalein,* 115, 116
Naphthylamine brown, 68
Neutral blue, 159
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Nierenstein's indicator, 172
Nile blue A, 162
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Nitramine, 16
Nitroaminoguaiacol, 11
Nitrobenzene (tri), 17,
Nitrobenzoylene urea, 14
Nitronaphthol, 3
Nitrotoluene, 18
Oil yellow,* 37
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Orange G,* 79
Orange GG, 79
Orange I, 72
Orange II, 73
Orange III,* 36, 44
Orange IV, 25
Orchil, 179
Orseille, 179
Parahelianthine, 44
Para methyl red, 20
Paranitrophenol, 12
Paraphthalein, 120
Pernambuco, 180
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Phenol red, 142
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Phloxin red BH, 112
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Poirrier's orange III, 44
Propyl red, 61
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Pyrogallol phthalein, 109
Quinaldine red, 150
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Red I, 76
Red cabbage extract, 171
Red violet 5R,* 92
Red violet 5RS, 100
Red wood, 180
Resazurin, 101
Resorcin blue,* 176
Resorcin phthalein, 113
Resorcin yellow, 78
Rhodamine B, 108
Riegel's indicator, 87
Rosaniline, 99
Roseine, 99
Rose magdala, 156
Rosolane, 155
Rosolic acid, 103
Rothols, 180
Rubine S, 107
Safranine,* 153
Salicyl yellow,* 74
Schaal's indicator, 166
Soluble blue 3M, 2R, 102
Soluble red woods, 180
Spirit yellow, 30
Spirit yellow G, 30
Spirit yellow R, 26
Tetra brom fluorescein, 110
T. N. T., 18
Thymol blue, 129
Thymolphthalein, 122
Toluidine orange* (ortho), 39
Toluidine orange* (meta), 47
Toluylene red,* 158
Töpfer's reagent, 37
Tournesol, 177
Troger and Hille's indicator, 173
Tropaeolin*,? 69
Tropaeolin D, 44
Tropaeolin G,* 23, 72
Tropaeolin O, 78
Tropaeolin OO, 25
Tropaeolin OOO No. 1, 72
Tropaeolin OOO No. 2, 73
Tropaeolin R, 78
Turmeric, 183
Turnsole, 177
Uranin, 113
von Müller's indicator?, 25
Weselsky's indicator, 101
Water blue, 102
XL Soluble blue, 105
Xylenol blue, 145
Xylenol phthalein,* 121
Xylidine orange* (meta), 40
Xylidine orange* (para), 18
Yellow B, 37
Yellow T, 78
Zellner's indicator, 113

TABLE 3

A CLARK AND LUBS' SELECTION OF INDICATORS SUPPLEMENTED BY COHEN (11, 14)

A = Cubic centimeters of 0.01*N* NaOH required per 0.1 g acid indicator to form sodium salt. Dilute to 250 cc for 0.04 % reagent. Use alcoholic solutions of methyl red (59) and cresolphthalein (119).

B = Approximate pH value of solution required for full "acid color" appertaining to range indicated

C = Approximate pH value of solution required for full "alkaline color" appertaining to range indicated

Index No.	A	B	C	Useful range pH	pK†
129	see below	conc. HCl	6	1.2-2.8	1.5
131	15.0	0	7	3.0-4.6	4.0
134	14.5	1	8	4.0-5.6	4.7*
59		?	9	4.4-6.0	[5.0]
135	23.5	3	10	5.0-6.6	6.2*
136	18.5	3	10	5.2-6.8	6.3
139	16.0	4	10	6.0-7.6	7.1
142	28.5	5	11	6.8-8.4	7.8
143	26.3	5	11	7.2-8.8	8.2
128	26.5	5	11	7.6-9.2	8.4*
129	21.5	6	12	8.0-9.6	8.9
119		6	12	8.2-9.8	[9.4]

* No salt and protein errors determined

† pK values are weighted means of values found in (2, 7, 11, 14, 19, 20, 24, 34).

Representative Corrections of Colorimetric Readings with Indicators of Table 3.4 to Bring Readings to Electrometric pH

	Peptone-beef infusion	10 % gelatine sol.	2 % egg-white	Urine
131 Brom phenol blue	0.05			
59 Methyl red	−0.10		0.24	0.05
136 Brom cresol purple	0.01	0.04		0.01
139 Brom thymol blue	0.10	0.04		0.02
142 Phenol red	0.04	0.20		0.00
143 Cresol red	0.03	0.20		
129 Thymol blue	0.04	0.20		
119 Cresolphthalein	−0.03	0.20		

Corrections at different salt content [after Kolthoff (29)]

Thymol blue (acid range)	0.1*N* KCl	−0.06
	1.0*N* KCl	+0.05
Brom phenol blue	0.1*N* KCl	−0.05
	1.0*N* KCl	−0.35
Methyl red	0.5*N* NaCl	+0.10
Brom cresol purple	0.5*N* NaCl	−0.25
Phenol red	0.5*N* NaCl	−0.15
Thymol blue	0.5*N* NaCl	−0.17

With color match between a solution at 70° and a standard buffer at 20° the solution at 70° will have the pH of the standard corrected by the following values according to Kolthoff (28).

Thymol blue (acid range)	0.0
Brom phenol blue	0.0
Methyl red	−0.2
Brom cresol purple	0.0 to +0.2
Phenol red	−0.3
Thymol blue (alk.)	−0.4

Corrections in sea water of salinity S [parts per 1000] after Ramage and Miller 1925 (unpublished).

S	5	10	15	20	25	30	35
Cresol red	−11	−17	−21	−24	−25	−26	−27

B. Sørensen's Selection of Indicators (56)

Index No.	Composition of test solution	Useful range pH	Sensitivity to neutral salts	Usefulness in presence of: True proteins	Usefulness in presence of: High conc. of products of proteolysis	Usefulness in presence of: Chloroform and toluene	Stability on standing
97	0.01%–0.05% aqueous	0 1–3 2	high	fair	good	with chloroform not, with toluene useful	acid solutions fade
155	0.01%–0.05% aqueous	0 1-2 9	high	fair	good	as above	as above
22	0.01 g in 1 cc N HCl + 50 cc alcohol + 49 cc water	1 2 2 1	low	not	fair	not	moderate
25	0.01% aqueous	1 4-2 6	low	not	fair	good	good
23	0.01% aqueous	1 2-2 3	low	not	fair	good	good
34	0.02 g in 1 cc $N/10$ HCl + 50 cc alcohol + 49 cc water.	2 3 3 3	low	not	good	not	moderate
32	0.01% aqueous	1 9 3 3	low	not	fair	good	good
35	0.01% aqueous.	2 6–4 0	low	not	fair	good	good
37	0.01 g 0.1 cc $N/10$ HCl + 80 cc alcohol + 20 cc water	2 9-4 0	low	not	good	not	moderate
44	0.01% aqueous	3 1-4 4*	low	not	fair	good	good
53	0.01 g in 0.4 cc $N/10$ HCl + 30 cc alcohol + 70 cc water	3 7-5 0	low	not	good	not	moderate
50	0.01 g in 60 cc alcohol + 40 cc water	3 5 5 7	low	not	good	good	good
59	0.02 g in 60 cc alcohol + 40 cc water	4 2 6 3*	low	S C	good	good	moderate
12	0.04 g in 6 cc alcohol + 94 cc water	5 0–7 0*	moderate	good	good	good	good
158	0.01 g in 50 cc alcohol + 50 cc water	6 8-8 0*	low	S.C.	good	S.C.	good
103	0.04 g in 40 cc alcohol + 60 cc water	6 9 8 0	low	fair	good	fair	good
72	0.01% aqueous	7 6–8 9	low	good	good	good	good
116	0.1 g in 150 cc alcohol + 100 cc water	7 3 8 7	moderate	S.C.	good	good	fair
120	0.05 g in 50 cc alcohol + 50 cc water	8 3–10 0*	moderate	S.C.	good	good	good—fades in strong alkali
122	0.04 g in 50 cc alcohol + 50 cc water	9 3-10 5	moderate	S.C.	good	good	fades in moderate alkali
75	0.01% aqueous	10 1 12.1			good		good
78	0.01% aqueous	11 1–12 7			fair		good

S.C. = useful in special cases

* Apparent pK values referred to standard buffers: Methyl orange (44) 3 7 (34 cf 60). Methyl red (59) see Table 3A (59, 60). Paranitrophenol (12) see Table 3C. Neutral red (158) 6 85 (34). Phenolphthalein see Table 3C.

Representative average corrections of colorimetric readings with indicators of Table 3B to bring readings to electrometric pH (see also Table 2).

Index No. of indicator	Corrections (after Sørensen (53)): In 2% peptone 0.01–0.3N salt	Corrections (after Sørensen (53)): In 2% egg-white 0.07-0.3N salt	Corrections in solutions containing salts
97	−0 02	−0 19	
155	−0 04	−0 19	
22	−0 06	> −0 90	
25	−0 27	> −1.40	
23	−0 30	> −1 40	
34	+0 01	> −0 80	
32	−0 22	> −0 80	
35	−0 41		
37	−0 08	−0 53	
44	−0 18		0.1N KCl, −0.08; 1.0N KCl, +0.23 Kolthoff
53	−0 02		
50	−0 03	+0 15	0.5N NaCl, + 0.10 Sørensen
12	−0 06	−0 04	0.5N NaCl, − 0.15 Sørensen (−0.05 Kolthoff)
158	+0 13	+0 68	0.5N NaCl, + 0.09 Sørensen
103	+0.08	+0.44	0.5N NaCl, − 0.06 Sørensen
72	−0.12	+0.10	0.5N NaCl, − 0.12 Sørensen
120	−0.01	+0 18	0.5N NaCl, − 0.12 Sørensen (−0.17 Kolthoff)
122	+0.01	+0 40	
75		+0.29	
78		−0 30	0.1N KCl, + 0.38; 1.0N KCl, + 0.62 Kolthoff

C. Michaelis' Selection of One-color Indicators

Index No.	Useful range pH	Conc. % in H_2O	pK (Michaelis and coworkers (38, 39)): In low salt content	pK (Michaelis and coworkers (38, 39)): In 0 15M salt	pK (Michaelis and coworkers (38, 39)): In 0.5M salt	pK (Kolthoff (31) at 15° and 0.05M salt)
1	0.03–1.3		[0.26]			
2	2 0–4.0	sat.	3 71 + 0.006 (15 − t°)	3.59	3.41	3.58

C. Michaelis' Selection of One-color Indicators.—(*Continued*)

Index No.	Useful range pH	Conc. % in H_2O	pK (Michaelis and coworkers (38, 39)) In low salt content	pK (Michaelis and coworkers (38, 39)) In 0.15*M* salt	pK (Michaelis and coworkers (38, 39)) In 0.5*M* salt	pK(Kolthoff (31) at 15° and 0.05*M* salt)
4	2.6–4.4	0.05	4.08 + 0.006 (15 − t°)	3.98	3.88	3.95
7			4.87	4.76	4.71	
8	4.0–5.8	0.025	5.16 + 0.005 (15 − t°)	5.08	5.01	5.15
10			5.35	5.30	5.25	
12	5.6–7.6	0.10	7.22 + 0.011 (15 − t°)	7.22	7.17	7.03
15	6.8–8.6	0.30	8.35 + 0.008 (15 − t°)	8.24	8.19	8.30
120	8.0–10.0	0.04	[9.76] + 0.011 (18 − t°)	9.6	9.5	
74	10.0–12.0		[11.2] + 0.013 (20 − t°)			

TABLE 4

Relation between Percentage, a, of Available Color and pH (after Michaelis and Gyemant (38))

Phenolphthalein..	18°	a	1.0	1.4	3.0	4.7	6.9	9.0
		pH	8.45	8.5	8.6	8.7	8.8	8.9
Phenolphthalein	18°	a	12.0	16.0	21.0	27.0	34.0	40.0
		pH	9.0	9.1	9.2	9.3	9.4	9.5
Phenolphthalein	18°	a	45.0	50.0	55.0	60.0	65.0	
		pH	9.6	9.7	9.8	9.9	10.0	
Phenolphthalein	18°	a	70.0	75.0	80.0	84.5	87.3	
		pH	10.1	10.2	10.3	10.4	10.5	
Alizarine yellow GG.	20°	a	13	16	22	29	36	46
		pH	10.0	10.2	10.4	10.6	10.8	11.0
Alizarine yellow GG..	20°	a	56	66	75	83	88	
		pH	11.2	11.4	11.6	11.8	12.0	

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(For a key to the periodicals see end of volume)

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HIGH VACUUM TECHNIQUE

Saul Dushman

Selected Formulae

1. *Amount of Gas Striking* 1 *Cm*² *per Sec*—

$$m = \frac{1}{4}\rho\Omega = p\sqrt{\frac{M}{2\pi RT}},$$

where ρ = density and Ω = average velocity

$= 43.74 \times 10^{-6} \times p\sqrt{M/T}$ g cm^{-2} sec^{-1} (p in baryes)

$= 58.32 \times 10^{-3} \times p\sqrt{M/T}$ g cm^{-2} sec^{-1} (p in mm of Hg)

n = number of molecules

$= 6.062 \times 10^{23}\dfrac{m}{M} = 2.653 \times 10^{19}\dfrac{p}{\sqrt{MT}}$ cm^{-2} sec^{-1} (p in baryes)

$= 3.535 \times 10^{22}\, p/\sqrt{MT}$ cm^{-2} sec^{-1} (p in mm of Hg)

2. *Laws of Molecular Flow (Flow of Gases at Very Low Pressures).*—Q = amount of gas flowing through any tube or opening in cm³ per sec

$$= \frac{p_2 - p_1}{W\sqrt{\rho_1}},$$

where $p_2 - p_1$ = difference of pressure

ρ_1 = density at 1 barye pressure

$$= \frac{M}{83.15 \times 10^6 T}.$$

W = "resistance" of tube or opening

For a circular opening (diam., d cm) in a thin plate

$$W = \frac{3.184}{d^2}$$

For a tube of diameter d and length l

$$W = \frac{2.394l}{d^3} + \frac{3.184}{d^2}$$

3. *Speed of Exhaust* (S) *of Given Volume* (v).—

$$S = \frac{v}{t}\log_e\frac{p_2}{p_1}$$

For $p_2/p_1 = 10$, t in sec and v in cm³

$$S = \frac{2.303v}{t}\ \text{cm}^3\,\text{sec}^{-1}$$

For pump exhausting through resistance

$$\frac{1}{S_o} = \frac{1}{S_p} + \frac{1}{F}$$

where S_o = observed speed of exhaust,

S_p = speed of pump through negligible resistance, and

F = rate of flow through resistance (cm³/sec)

$$S = \frac{Q}{p_2 - p_1} = \frac{1}{W\sqrt{\rho_1}}$$

TABLE OF MOLECULAR DATA

	H_2	He	N_2	O_2	A	Hg	CO	CO_2	H_2O
Mean Free path (cm) at 25°C and 1 barye	19 2	29 6	10.0	10.7	10.6	[3.24]*	9.92	6.68	[6.03]*
$(1/d^2) \times 10^{-15}$ (Number of molecules per cm²)	1 74	2 74	1 01	1.11	1.19	1.11	0.98	0.92	1.19
Micrograms (10^{-6} g) of gas striking 1 cm² per sec at 25°C and 1 barye	3 597	5.062	13 42	14.33	16.01	35.89	13.42	16.81	10.76
Number of molecules striking 1 cm² per sec at 25°C and 1 barye. Unit = 10^{15}	1082	769 3	283 7	271 7	243 3	10.85	283 7	231.7	362.0

* Values in square brackets refer to 0°C Note: 1 barye = 0 75 × 10^{-3} mm mercury. Values of mean free path calculated from viscosity coefficients

RATE OF FLOW OF AIR AND HYDROGEN AT LOW PRESSURES AND 20°C

l	d	W	F (air)	F (H_2)
1 cm	1 cm	5 58	5 204	197 10
10	1	27 12	1 070	40 53
1	0 1	2 712 4	10 70	40 53
10	0 1	24 258	1 196	3 60

(Note.—These relations are valid only for pressures so low that the mean free path is equal to or greater than d.)

DATA ON VARIOUS TYPES OF PUMPS

	S_p cm³ sec⁻¹	Fore pump pressure	Min. pressure attainable
Gaede rotary mercury	100 (max.)	*ca.* 1 cm	10^{-4} mm
Gaede molecular	1 400	0 01 mm	$<10^{-6}$ mm
Gaede diffusion	80	0 01 mm	$<10^{-6}$ mm
Langmuir condensation (metal)	4 000	0 01 mm	$<10^{-6}$ mm
Gaede two stage metal	60 000	20 mm	$<10^{-6}$ mm

Evolution of Gas from Glass.—For rate at which gas is evolved at different temperatures, *v.* R. G. Sherwood (*1*, **40**: 1645; 18) and J. E. Shrader (*2*, **13**: 434; 19).

Chemical Clean-up Reagents for Producing Low Pressures.—1. Charcoal in liquid air. 2. Ca or Mg volatilized in sealed-off device, cleans up all gases except those of group 0. 3. P_2O_5, efficient for water vapor. 4. Palladium black at low temperatures, very good for hydrogen.

SOME VAPOR PRESSURES AT LOW TEMPERATURES

Substance	t°C	p, mm	p, baryes
Hg	− 78	3×10^{-9}	4×10^{-6}
H_2O	−111	$0\ 75 \times 10^{-6}$	1×10^{-3}
CO_2	−182	$0\ 75 \times 10^{-5}$	1×10^{-2}
CO_2	−193	$0\ 75 \times 10^{-6}$	1×10^{-3}
CO	−190	863	
CH_4	−185 8	79 8	
C_2H_4	−188	0 076	
C_2H_6	−180	0.076	
Vaseline (Stopcock grease)	−190 (fresh liquid air)		$<10^{-6}$

PSYCHOLOGICAL DATA PERTAINING TO ERRORS OF OBSERVATION

R. S. WOODWORTH

(Additional data pertaining to sight and hearing are given in other sections of International Critical Tables treating of the mechanical equivalent of light, colorimetry, and the physical aspects of audition. Consult index. Editor.)

SIGHT

Much of the available data pertaining to the sensitivity of the eye have been obtained under such conditions that the exact value of the stimulus cannot satisfactorily be determined. Some are expressed in terms of the illumination, others in terms of the brightness, of a screen; the latter procedure is to be preferred. If the illuminated screen were a perfect diffuser of the light, and also a perfect reflector, if illuminated from the front, or a perfect transmitter, if illuminated from the rear, then its brightness (B) expressed in millilamberts would be numerically equal to 0.1 of its illumination (I) expressed in meter-candles. In the following data, this relation has been used to reduce to the basis of B, data which have been given in terms of I. Although in many cases the screens surely did not possess the properties thus assumed, it seems probable that the error so introduced is of less importance than those arising from other sources. Data for reaction times will be found near the end of this report.

Spectral range (41) for daylight vision is λ = 397mμ to 760 mμ; for twilight vision (illumination too low for color perception), λ = 440 mμ to 670 mμ.

Threshold value = minimum stimulus which can be visually perceived as light; the perception of form is not involved. For white light and a thoroughly light-adapted eye, luminous area subtending an angle of 10°, it is that corresponding to a brightness of 0.1 millilambert (37). For white light and a dark-adapted eye, it varies with the area of the luminous area and with the duration of stimulus as shown in Table 1.

TABLE 1.—THRESHOLD OF VISION FOR DARK-ADAPTED EYE (45)

D = distance; θ = visual angle subtended by shortest dimension of area; B = brightness required for perception; P = power entering eye; t = duration of exposure. Diameter of pupil = 8.3 mm.

Unit of: Area = 1 cm²; D = 1 cm; B = 1 microlambert; P = 1 milliwatt = 10^{-10} erg sec⁻¹; t = 1 sec.

Form	Area	D	θ	B	P	t	B‡
Star*	0 00785	300	1 2′	7.20	17.1	0.002	0.362
Star*	0 00785	150	2.30	2.60	24 8	0 006	0 098
Star*	0 00785	35	9 8	0 24	42.1	0.011	0.0446
Square	0 04	35	19.6	0 028 3	25 3	0 020	0.0239
Square	0 25	35	50	0.006 62	37	0.034	0.0123
Square	1.00	35	1° 30′	0 002 41	54	0 160	0.0071
Square	4 00	35	3 16	0 001 02	91	0 250	0 0051
Square	9 00	35	4 54	0 000 45	91	0.500	0.003 54
Square	36.0	35	9 44	0 000 258	208	1.000	0.002 62
Square	144 0	35	18 56	0 000 175	564	2.000†	0.000 77

* Circle, Diameter = 1 mm

† If $t = \infty$, B = 0 000 45, t = 4, B = 0 000 63

‡ For square, area = 9 cm², D = 35 cm, θ = 4 9°.

Table 2.—Change in Threshold during Adaptation

Threshold = brightness (B) of a surface which can just be seen Sensitivity (S) = $1/B$. In light adaptation, I = illumination to which dark adapted eye was subjected for the time t; S was measured 10 sec after this exposure. Unit of t = 1 min; B = 1 microlambert; S = 0 1 millilambert^{-1}, I = meter-candle

*Dark adaptation (38)			†Light adaptation (34, 39)				
t	B	S	I \ t	5	25	60	Day‡
				S	S	S	S
0	100	1	[illegible]	23 000	9950	5800	435
0 5	5 0	20	[illegible]	17 500	7440	3700	230
4	1 33	75	1	10 400	5200	3250	200
9	0 054	1850	2	8130	3360	2600	115
14	0 0096	10 400	3	5200	2740	2038	87
19	0 0038	26 000	6	3470	2040	1600	48
23	0 001 43	69 500	10	3000	1450	1130	40
26	0.001 56	94 700	15		1000	312	
31	0 000 57	174 000	60		95	36	
39	0 000 51	195 000	80		54	28	
51	0 000 48	208 000	110		54	24	
61	0.000 46	215 000					

* Following nearly complete light adaptation Luminous surface was 10 cm in diameter and 57 cm from eye (θ = 10°)

† Following nearly complete dark adaptation Luminous surface was 1 m square and 1 m from eye (θ = 45°); initial S, just before exposure to I, was 10 000 millilambert^{-1}.

‡ Moderate diffused day-light.

The rates of adaptation to darkness and to light are indicated in Table 2 in which are given the threshold values at various intervals (1) after removal from daylight, and (2) immediately (10 seconds) after removal from a specified exposure, the eye before exposure having been kept in darkness for 45 min. The visibility of monochromatic light varies with the wave-length, and the *relative visibility* of lights of different wave-lengths depends upon their intensities. (Figs. 1, 2.) For a large surface with a brightness of 5 to 80 millilamberts, the maximum visibility for the average observer, is near (9) $\lambda = 557.6$ mμ, but even normal subjects exhibit individual differences; out of 125 subjects, the percentage finding the maximum at each of the several wave-lengths was as follows (9):

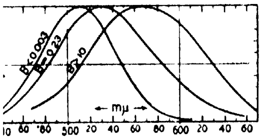

Fig. 1.—Relative visibility (V) (28, 40).

B = brightness, unit = 1 millilambert; abscissae = wave-lengths.

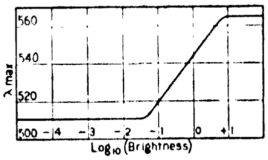

Fig. 2.—Position (λ_{max}) of maximum visibility (28, 40)

Unit of brightness = 1 millilambert.

λ	%	λ	%	λ	%	λ	%	λ	%	λ	%
549	2	553	4	557	12	561	2	565	2	569	0
550	2	554	7	558	13	562	3	566	2	570	2
551	5	555	9	559	12	563	2	567	0		
552	3	556	8	560	7	564	1	568	2		

All of the preceding refer to direct vision. The sensitivity of other portions of the retina is greater.

Complementary colors are those pairs of colors which, when superposed upon the retina in suitable proportions, produce the sensation of white. Grunberg states that if their wave-lengths are λmμ, λ'mμ, then $(\lambda - 559)(498 - \lambda') = 424, \lambda > 559, \lambda' < 498$ (47); there are no complementaries to the colors in the range 498mμ to 559mμ.

Stable, or invariable, colors are those which do not change in hue, except to become gray, as they are moved from the fovea to the periphery of the retina. They are: yellow of λ = 570mμ; bluish green of λ = 490mμ; blue of λ = 460mμ; and a non-spectral bluish red (21).

Discrimination of Brightnesses.—For large adjacent fields, differences of 1 % or even of 0.8 % in the brightness can be detected (31) if the brightness is of the order of 100 millilamberts. Under such conditions the color of the light has no effect upon the discrimination. At lower brightnesses, the sensitiveness to change in brightness depends upon both the color and the brightness (Fig. 4).

Resolving power of the eye is the smallest angular separation at which two points, under the best illumination, can be seen as distinct. For different observers, it varies from 50″ to 93″ (20); the generally accepted normal value is 1′. It varies with the color of the light. In day-light and on a bright background, a dark line a few minutes long can be seen if it is 1.2″ wide; but, on a dark background, a bright line is not visible unless it is at least 3.5″ wide (48).

Aligning power, the ability to detect a lack of alignment of two similar, adjacent lines of the same width, as in setting a vernier, exceeds the resolving power. The average error (48) of skilled observers under best conditions corresponds to a visual error of not over 3″; in coincidence range-finders, the images can be aligned with an error not greater than 12″ and sometimes as small as 2″.

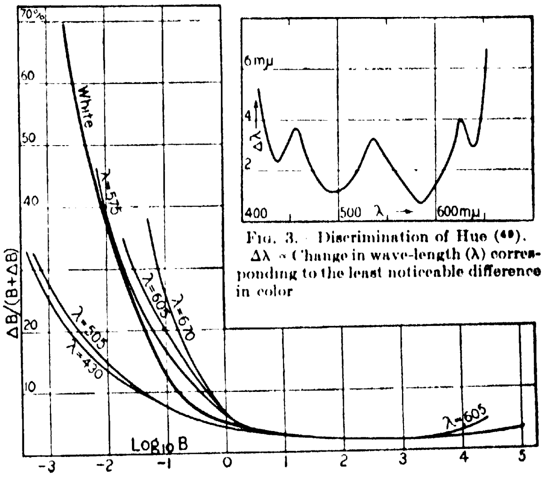

Fig. 3. Discrimination of Hue (49).

Δλ = Change in wave-length (λ) corresponding to the least noticeable difference in color

Fig. 4.—Discrimination of brightnesses (39, 40).

ΔB = least noticeable increase in the brightness (B). Unit of B is 1 millilambert; of wave-length (Δ) is 1mμ.

Acuity, or discrimination of form, is closely related to the resolving power, but differs from that in dealing, in general, with extended, interpenetrating, bright and dark areas, and frequently with low brightnesses. The *absolute acuity* (A) is the reciprocal of the smallest visual angle for which neighboring contrasted portions of the field can be seen as separated. Its variation with the brightness (B) of the brighter portions of the field is given by the equation (25) $A = c + k \log B$; the values of the constants c and k are determined by the units, the character of the field, and the eye; some values are given in Table 3. The unit commonly employed for A is 1 reciprocal minute.

Table 3.—Absolute Acuity (A) and Brightness (B)

$A = c + k \log_{10} B$ (*cf.* Fig. 5)

Unit of: A = 1 minute^{-1}; B = 1 millilambert

Limits of B	c	k	Field	Lit.
0 01 to 43.5	1 05	0 415	Snellen and similar charts	(27)
40 to 1000	1 69	0.000	Snellen and similar charts	(27)
0 1 to 18	1 44	0 573	Snellen and similar charts	(12)
0 02 to 21	1 23	0 282	Crossed gratings	(8)
0 06 to 26	1 33	0 262	Crossed gratings	(7)

When the test field is a Snellen test chart, the acuity is commonly expressed as the ratio of the maximum distance (d_m), at which the characters can be distinguished, to the standard distance (d_s). This ratio (d_m/d_s) may be called the *Snellen acuity;* it is numerically equal to the reciprocal of the visual angle (in minutes) subtended by the sides of the elementary squares of the chart. As expressed in these units, the acuity of the average good eye exceeds 1.00; for the *E*-hooks, the mean of 100 subjects was 1.74, ranging from 1.00 to 2.45 (54).

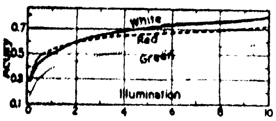

FIG. 5.—Acuity in white and in chromatic illumination (46)
Unit of acuity = 1 Snellen unit; of illumination = 1 meter-candle

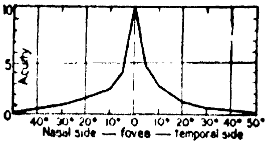

FIG. 6.—Relative acuity in indirect vision (30).
Abscissa indicates angular position of image upon the retina.

The effect of dark adaptation upon acuity may be obtained by determining, at various intervals (t) after the light adapted eye had been placed in darkness, the minimum illumination (I) in which it can distinguish Snellen test characters placed at a known distance. For a distance corresponding to a Snellen acuity of 6/30 (= 0.2), the median[1] values of I for 6 observers having in daylight a Snellen acuity of 9/6 (= 1.5) were found to be as follows (13):

t	0	5	10	15	25	35	45 minutes
I	1.09	0.79	0.56	0.40	0.34	0.42	0.42 meter-candles

The acuity depends also upon the color of the light, and upon the position of the image upon the retina. See Figs. 5, 6.

Detection of Differences in Length.—About 1% of the length is the least noticeable difference for simultaneously presented parallel lines which are relatively displaced (result of several old investigations). More recent work shows that a variable line, 1 to 5 cm long, can, by eye, be set to equality with a standard line with a probable error, for a single setting, of only 0.4%; for shorter lines the error is greater, attaining 0.5% for lines 1 mm long (36). When the time allowed for observation and judgment is short, the differences which can be detected with certainty are considerably greater. If the sign of the difference is to be judged correctly in 75% of the trials, then, for a 10 cm line, the difference must be 3.5 mm if the time is 4 seconds, and over 5 mm if the time is only 0.5 second (18).

Decimal Subdivision of a Small Distance.—When a fine line is set on a millimeter scale to successive positions in random order, and the subject is required to estimate its position to the nearest 0.1 mm, the average actual setting, for each tenth as estimated by 10 subjects (total of 6000 readings), for horizontal and for vertical scales was as follows (3, 52):

Estimate	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Horizontal	0.126	0.231	0.336	0.423	0.509	0.591	0.676	0.773	0.886	1.001
Vertical	0.106	0.202	0.308	0.395	0.486	0.576	0.652	0.757	0.875	0.992

The lines of the scale were presumably of the same width as the "fine line" of variable position. Settings were distributed over a length of 30 mm, the illumination was good, and the distance was that for best reading.

SENSES OTHER THAN SIGHT

Range of audible tones is from 18 to 18 600 double vibrations per second (44, 53); at high intensities the lower limit may be reduced to 12. At the upper limit, individuals varied from 15 000 to 22 000 d.v. per sec. As the age increases, the upper limit becomes lower (Fig. 7).

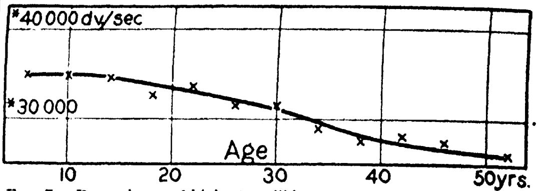

FIG. 7.—Dependence of highest audible tone upon age of subject (4).
* It is probable that these frequencies should be divided by two.

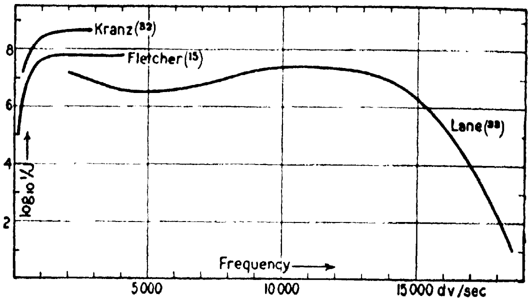

FIG. 8.—Aural sensitivity.
J = minimum audible power, unit = 1 erg cm^{-2} sec^{-1}. Data in terms of effective, or r.m.s., pressure (P) in dynes cm^{-2} have been reduced to erg cm^{-2} sec^{-1} (E) by means of the relation $P = \sqrt{dvE} = 6.5\sqrt{E}$; d = density of air, v = velocity of sound in air, both in cgs units.

REACTION TIMES

The *simple reaction time*, or, briefly, the *reaction time*, is the interval which elapses between the application of a definite, expected stimulus and the performance of a prescribed movement (usually a finger movement) indicating that it has been perceived.

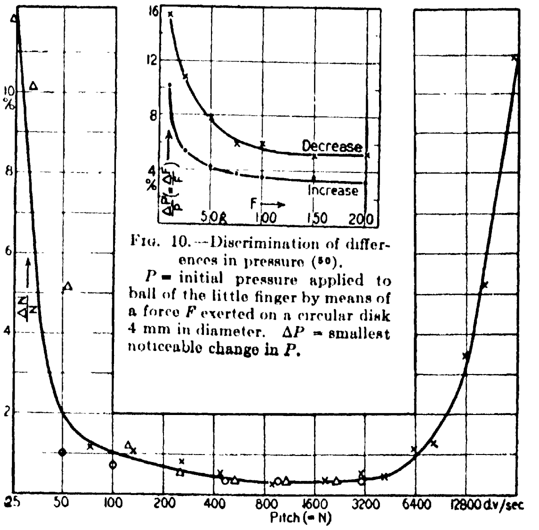

FIG. 10.—Discrimination of differences in pressure (50).
P = initial pressure applied to ball of the little finger by means of a force F exerted on a circular disk 4 mm in diameter. ΔP = smallest noticeable change in P.

FIG. 9.—Discrimination of pitch.
N = number of double vibrations per sec; ΔN = smallest noticeable change in N. o = Knudsen (26), x = Stücker (51), Δ = Vance & Schaefer (53).

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[1] For each value of t, the 6 observed values of I are arranged in order of magnitude, the mean of the third and the fourth of the values is by definition the *median* of the set.

Light.—For foveal stimulation of medium intensity, reaction time is 0.190 (±0.008) sec; individuals range from 0.150 to 0.225 sec. It is the same for withdrawal as for initiation of stimulus (22). For faint stimulation, near threshold, interval is increased by 0.04 to 0.05 sec (16); reaction to withdrawal is 0.005 to 0.025 sec quicker than to initiation of stimulus (22). For photometrically equal stimuli of different colors, reaction time is independent of the color (22). Reaction time for eye to turn towards a stimulus in indirect vision is 0.151 sec (or 1 181 sec) if stimulus lies 1° (or 5°) from fixation point (10). For medium intensity, reaction time to monocular stimulation is about 0.015 sec greater than for binocular (43).

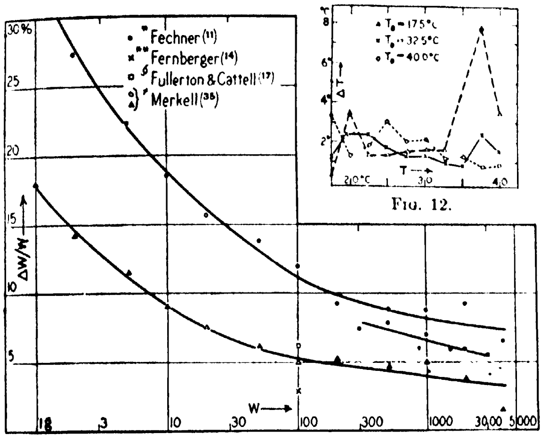

FIG. 11.—Discrimination of differences in lifted weights.
ΔW = smallest noticeable change in the weight W.

* Weights had horizontal handles, were lifted successively with same hand

** Cylindrical boxes lifted successively with same hand, ΔW is change for which 50 % of the estimates were of proper sign.

§ Cylindrical boxes lifted successively with same hand; ΔW is change for which 75 % of the estimates were of proper sign.

† Weights lifted by downward pressure of finger on a lever, several series of observations; curves represent the extremes.

FIG. 12.—Discrimination of differences in temperature (1).

Both hands were adapted by immersion in water of temperature T_a, they were then separately placed simultaneously in water at temperatures T and T_1. ΔT = least value of $(T_1 - T)$ which could be detected

TABLE 4.—DISCRIMINATION REACTION TIME

Unit of: T = 0 001 sec; L_1, L_2 = 1 cm, λ = 1mμ = 10Å

Position of squares* or circles†						Lengths‡ (21)		
Contrast (21)	λ	T	Contrast (21)	λ	T	L_1	L_2	T
Black and White		205	Red (640) and Orange red	627	270	1	1 3	312
Red	640	222	Orange	614	257	1	1 25	313
Orange	614	218	Yellow	585	237	1	1 2	318
Yellow	585	211	Green	521	222	1	1 15	326
Green	521	218	Blue	452	231	1	1 1	335
Blue	453	226	Yellow and Green	521	232	1	1 05	351
†Circles (24)		296	Blue	452	222			

* Two colored squares each 3 by 3 cm, placed side by side; observer was to react with corresponding hand to indicate on which side the previously specified square was placed This type of discrimination reaction is the quickest The same procedure was used in the discrimination of lengths.

† On a background of approximately 2 6 millilamberts and at a visual angle of 45′ to each side of fixation point was a circle of angular diameter = 24′, brightness = 3 5% greater than that of background Either circle could be made to disappear, and the subject, by a reaction with the corresponding hand, indicated which disappeared.

Sound.—For finger reaction to sound of medium intensity, reaction time = 0.136 (±0.002) sec; individuals range from 0.082 to 0.195 sec. For very faint sound, the interval is increased by 0.06 to 0.07 sec (16).

Touch.—For finger reaction to tactile stimulus of medium intensity, reaction time is 0.148 sec (23).

The *discrimination reaction time* is the interval which elapses between the application of one of two possible, definite, expected stimuli and the performance of the prescribed movement indicating which of the two stimuli has been applied. For printed letters, 10-point type, average for the alphabet, the reaction time for Roman capitals is 0.327 sec, Roman lower case 0.325, for short words 0 353, for long words 0.355, for small (1 cm square) pictures of familiar objects 0 336 sec (6). For other data, see Table 4.

Number Limitation and *Span of Apprehension.*—For college students, the greatest number of digits which an individual can repeat correctly immediately after a single auditory presentation averages 7.6 (5, 19), individuals range from 5 to 11 (8); for visual presentation the average is 8.0 (19).

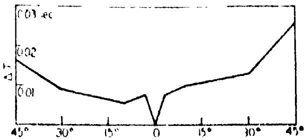

FIG. 13.—Reaction time for nonfoveal stimulation (43).
ΔT = excess of reaction time over that required for foveal excitation. Abscissa indicates angular position of image upon the retina. Finger reaction.

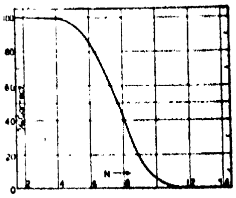

FIG. 14.—Span of apprehension (41).
N = number of dots exposed; ordinates = % of judgments which were correct.

When a number of black dots irregularly arranged upon a well illuminated white background were exposed to view for a very short interval (0.038 sec) and the subject was required to determine the number of dots presented, the average number of correct judgments made after considerable, but not extreme, practice was as shown in Fig. 14. The visual angle subtended by the dots was well above the threshold value.

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(For a key to the periodicals see end of volume)

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ARRANGEMENT OF CHEMICAL SUB-

ARRANGEMENT OF CHEMICAL SUBSTANCES

Throughout I. C. T., except when otherwise indicated, the tabular arrangement of all chemical substances and of all systems capable of representation by formula is in accordance with a system called the "Standard Arrangement," which will now be explained and which should be learned by every user of I. C. T.

Elementary Substances

All tables containing *only* elementary substances (𝔄-Tables) are arranged in alphabetical order of the symbols of the elements. In tables containing both elements and compounds (𝔄𝔅-Tables) the elements follow the "standard arrangement," *v. infra*

Chemical Compounds and Other Systems Represented by Formula

The arrangement is based upon the following table of "Key-numbers" of the elements:

ARRANGEMENT DES SUBSTANCES CHIMIQUES

L'arrangement tabulaire de toutes les substances chimiques et de tous les systèmes susceptibles d'une représentation par formule est, dans les T. C. I, excepté lorsqu'il y a une autre indication, en accord avec un système appelé "arrangement type," (standard arrangement) expliqué ci-dessous, qui devra être appris par chaque personne qui veut utiliser les T. C. I.

Substances Élémentaires

Toutes les tables ne contenant que les substances élémentaires (Tables 𝔄) sont arrangées dans l'ordre alphabétique des symboles des éléments. Dans les tables contenant les éléments et les corps composés (Tables 𝔄𝔅) les éléments se trouvent suivant l' "arrangement type" voir *infra*.

Composés Chimiques et Autres Systèmes Représentés Par Formule

L'arrangement est basé sur la table suivante des "nombres clés" des éléments

Key-numbers of the Elements — Nombres clés des éléments

-6	5	-4	-3	2	1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(He	Ne	A	Kr	Xe	Rn)	O	H	F	Cl	Br	I	(85)	S	Se	Te	N	P	As	Sb	Bi	C	Po	Si	Ti	Ge
						46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
						Cr	Mo	W	U	V	Cb(Nb)	Ta	Pa	B	Al	Sc	Y	La	Ce	Pr	Nd	(61)	Sa	Eu	Gd
Ac	Ag	Al	As	Au		B	Ba	Be	Bi	Br	C	Ca	Cb	Cd	Ce	Cl	Co	Cr	Cs	Cu	Dy	Er	Eu	F	Fe
74	32	55	13	33		54	79	75	15	5	16	77	51	29	59	4	44	46	85	31	67	69	64	3	43
						Os	P	Pa	Pb	Pd	Po	Pr	Pt	Ra	Rb	Re	Rh	Ru	S	Sa	Sb	Sc	Se	Si	Sn
						35	12	53	23	41	17	60	37	80	84	34	40	39	8	63	14	56	9	18	22

To locate a given compound, first write its "key-formula," neglecting water of crystallization, thus:

Afin de situer un composé donné, il faut d'abord écrire sa "formule-clé," en négligeant l'eau de cristallisation, ainsi:

Compound	Composé	Na_2SO_4	$HClO_4.3H_2O$	$Hg(C_{18}H_{33}O_2)_2$	$2Fe_2O_3.P_2O_5.12H_2O$	$Ni_2Pr_2(NO_3)_{12}.24H_2O$	$I_2C_6H_3SO_3H$	$(NH_4)_2CO_3$
Key formula	Formule-clé	82-8-1	4-2-1	30-16-2-1	43-12-1	60-45-11-1	16-8-6-2-1	16-11-2-1

In writing a key-formula the key-numbers must be written *in descending order.*

All chemical compounds (𝔅-Tables) are arranged in the inverse numerical order of their key-formulae. *Example:* to find the compound $Hg(C_{18}H_{33}O_2)_2 = 30 - 16 - 2 - 1$; First, turn to section 30 of the table. Then follow down the column of chemical formulae until element 16 (C) is first encountered. From this point continue until element 2 (H) is found, and then on until element 1 (O) is reached. At this point will be found all the compounds composed of the four elements Hg, C, H, and O and these compounds are arranged in an obvious manner according to the subscripts in the chemical formula. To facilitate the use of the tables, key-numbers are inserted at frequent intervals either along the top of the page or down the left hand column or both

In looking for a chemical compound *always consult the 𝔅-Table*, the scope of which provides for *all* chemical compounds except those of the radioactive elements, of which only compounds of U, Th and Ra are given in the 𝔅-Table. For the others see p. 364. In certain of the 𝔅-Tables, at the point where key-formulae beginning with 16 occur, there will be found frequently only a few of the simpler compounds, and the reader will be referred to a

Lorsqu' on écrit une formule-clé, les nombres clés doivent être écrits *dans l'ordre des valeurs décroissantes.*

Tous les composés chimiques dans toutes les tables (Tables 𝔅.) sont arrangés d'après l'ordre numérique inverse de leurs formules-clés. *Exemple:* pour trouver le composé $Hg\ (C_{18}H_{33}O_2)_2 = 30\ 16-2-1$; il s'agit premièrement de chercher la section 30 de la table; ensuite de suivre en descendant la colonne des formules chimiques jusqu'à ce qu'on trouve l'élément 16 (C). De ce point, on continue jusqu'à ce qu'on rencontre l'élément 2 (H), et ensuite jusqu'à ce que l'élément 1 (O) soit atteint. On trouvera alors à ce point tous les composés renfermant les quatre éléments Hg, C, H et O et ces composés sont arrangés d'une manière apparante en relation avec les indices de leurs formules chimiques. Afin de faciliter l'usage des tables, les nombres-clés sont inscrits, à de fréquents intervalles, ou au haut de la page ou le long de la colonne gauche, ou aux deux places.

Pour la recherche d'un composé chimique, il s'agit de *consulter toujours la Table* 𝔅 dont le but est de renseigner sur *tous* les composés chimiques, à l'exception des éléments radio-actifs, dont seuls ceux de U, Th et Ra sont donnés dans la Table 𝔅. Pour les autres, voir p. 364. Dans certaines des Tables 𝔅, au point où les

STANCES AND SYSTEMS IN I. C. T.

DIE ANORDNUNG DER CHEMISCHEN VERBINDUNGEN

Durch die ganzen I. C. T., ausgenommen es ist etwas anderes angegeben, ist die tabellarische Anordnung aller chemischen Verbindungen und aller durch chemische Zeichen oder Formeln darstellbarer Systeme, nach der "Normal-Anordnung" (standard arrangement), durchgeführt. Sie ist im folgenden dargelegt und soll von jedem Leser der I. C. T. erlernt werden.

Elementare Stoffe

Alle Tafeln, welche *nur* elementare Stoffe (𝔄-Tabellen) enthalten, sind in alphabetischer Reihenfolge nach den Symbolen der Elemente angeordnet. In den Tafeln, welche beides, Elemente und Verbindungen (𝔄𝔅-Tabellen), enthalten, folgen die Elemente der "Normal-Anordnung." Siehe weiter unten.

Die chemischen Verbindungen und andere durch Formeln darstellbare Systeme

Die Anordnung ist auf der folgenden Tafel begründet, welche die "Schlüsselnummern" der Elemente enthält:

ORDINE DI ELENCAZIONE DELLE SOSTANZE

In tutti i volumi delle T. C. I. l'ordine in cui le sostanze ed i sistemi rappresentabili con formule sono disposti nelle tabelle è (tranne che non sia diversamente indicato) quello "standard" illustrato più avanti. Chiunque voglia servirsi delle T. C. I. deve anzitutto apprendere in che consiste questo sistema "standard."

Sostanze Elementari

Tutte le Tabelle contenenti soltanto sostanze elementari (tabelle 𝔄) sono disposte secondo l'ordine alfabetico dei simboli degli elementi. Nelle tabelle che comprendono elementi e composti (tabelle 𝔄-𝔅) gli elementi sono ordinati secondo la disposizione "Standard" v. infra.

Composti Chimici ed Altri Sistemi Rappresentati da Formule

La disposizione è basata sul quadro seguente di "numeri chiave" degli elementi.

Schlüsselnummern der Elemente — Numeri chiave degli elementi

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Zr	Sn	Pb	Th	Ga	In	Tl	Zn	Cd	Hg	Cu	Ag	Au	Re	Os	Ir	Pt	Ma	Ru	Rh	Pd	Mn	Fe	Co	Ni
66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86				
Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ac	Be(Gl)	Mg	Ca	Sr	Ba	Ra	Li	Na	K	Rb	Cs	(87)				
Ga	Gd	Ge	Gl	H	Hf	Hg	Ho	I	In	Ir	K	La	Li	Lu	Ma	Mg	Mn	Mo	N	Na	Nb	Nd	Ni	O
25	65	20	75	2	73	30	68	6	26	36	83	58	81	72	38	76	42	47	11	82	51	61	45	1
Sr	Ta	Tb	Te	Th	Ti	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	(61)	(75)	(85)	(87)						
78	52	66	10	24	19	27	70	49	50	48	57	71	28	21	62	34	7	86						

Um eine gegebene Verbindung aufzufinden, hat man zuerst seine Schlüsselformel aufzuschreiben, wobei man das Kristallwasser auslässt. z B.:

Per trovare il posto di un dato composto bisogna prima scrivere la formula chiave trascurando l'acqua di cristallizzazione, p. es.

Verbindungen	Composto	Na_2SO_4	$HClO_4\,3H_2O$	$Hg(C_{18}H_{33}O_2)_2$	$2Fe_2O_3\,P_2O_5\,12H_2O$	$Ni_3Pr_2(NO_3)_{12}.24H_2O$	$I_2C_6H_3SO_3H$	$(NH_4)_2CO_3$
Schlüsselformel	Formula chiave	82-8-1	4-2-1	30-16 2-1	43-12 1	60- 45-11 1	16 8-6 2-1	16-11-2-1

In die Schlüssselformel müssen die Schlüsselnummern in *absteigender* Reihenfolge geschrieben werden.

Alle chemischen Verbindungen (𝔅-Tabellen) sind in der umgekehrten Reihenfolge der Schlüsselformeln angeordnet Z. B.: Um die Verbindung $Hg(C_{18}H_{33}O_2)_2$ = 30-16-2-1 zu finden, hat man zuerst den Abschnitt 30 aufzusuchen. Dann hat man den Kolonnen der chemischen Verbindungen abwärts zu folgen, bis man zuerst das Element 16 (C) antrifft, von da an setzt man weiter fort, bis das Element 2 (H) gefunden ist und dann weiter, bis das Element 1 (O) erreicht ist. Bei dieser Stelle werden alle Verbindungen gefunden werden, welche sich aus den 4 Elementen Hg, C, H, und O zusammensetzen. Diese Verbindungen sind in deutlicher Art, entsprechend der Bezeichnungsweise chemischer Formeln, angeordnet. Um den Gebrauch der Tafeln möglichst zu erleichtern, sind die Schlüsselnummern häufig an verschiedenen Stellen eingefügt. Sie befinden sich entweder am Kopf der Seiten, oder auf der linken Seite unten, oder an beiden Stellen.

Um eine chemische Verbindung zu suchen, *benutze man immer die 𝔅-Tabellen:* die *alle* chemischen Verbindungen enthalten, ausgenommen jene der radioaktiven Elemente. Von diesen sind

Nella formula chiave, i numeri chiave devono essere scritti *in ordine decrescente.*

Tutti i composti in tutte le tabelle (Tabelle 𝔅) sono disposti nell'ordine numerico inverso delle loro formule chiavi.

Supponiamo ad es. di voler trovare il composto Hg $(C_{18}H_{33}O_2)_2$ = 30-16-2 1. Prima si cerca la sezione 30 della Tabella, poi si scorre la colonna delle formule fino ad incontrare l'elmento 16 (C). Da questo punto si continua finchè si trova l'elemento 2 (H), e quindi fino a raggiungere l'elemento 1 (O). Qui si trovano tutti i composti risultanti dai quattro elementi Hg, C, H e O ordinati secondo gli indici delle formule. Per facilitare l'uso delle tabelle i numeri chiave sono inseriti ad intervalli frequenti nella testata o lungo il margine sinistro della pagina, o nell'una e nell'altro.

Per cercare un composto bisogna *sempre consultare la tabella 𝔅* che contiene *tutti* i composti tranne quelli degli elementi radioattivi; di questi sono riportati nella tabella 𝔅 soltanto i composti di U, Th, Ra. Per gli altri vedi p. 364. In alcune tabelle 𝔅, laddove si trovano formule chiave che cominciano con 16, si troveranno spesso soltanto pochi composti fra i più semplici e il lettore

ℭ-Table where the remainder of such compounds will be found listed under a different arrangement known as

The ℭ-Arrangement

In this arrangement the compounds are arranged according to their empirical formulae (*including* water of crystallization), in the order C, H, with the remaining symbols alphabetical, *e.g.*, $C_4H_4I_2O_2S$. The ℭ-Tables, however, will not contain any carbon compound whose key-formula contains a number greater than 16.

SYSTEMS OF MORE THAN ONE COMPONENT

The components of each system are first arranged according to the standard arrangement, giving the order A, B, C, etc. The systems are then arranged, according to the standard arrangement, in the order of their A-components. All systems having the same A-component will be found (under that component) in the order of their B-components, etc.

In certain tables, the above plan will be based upon the ℭ-arrangement instead of the standard arrangement. Such cases will always be so indicated.

Name Indices

The chemical formulae of nearly all of the organic compounds and minerals whose properties are given in I. C. T. can be found with the aid of the extensive indices of names given on p. 174 and 280. If the name is not found there, other works of reference must be consulted for the formula. It should be noted, however, that the exact formula is not required. The compound can be readily located if only the elements composing it are known (in the case of inorganic compounds) or if only the number of carbon atoms are known (in the case of organic compounds) provided only that the user can recognize either name or formula when he sees it.

formules-clés commençant par 16 se présentent, on ne trouvera fréquemment qu'un petit nombre de composés plus simples, et le lecteur sera alors renvoyé à une Table ℭ, où le reste de ces composés se trouvera disposé d'une façon différente nommé

L'Arrangement ℭ

Dans cet arrangement, les composés sont disposés en relation avec leurs formules empiriques (l'eau de cristallisation inclusivement) dans l'ordre C, H, les symboles restants venant ensuite dans l'ordre alphabétique; par ex: $C_6H_4I_2O_2S$. Cependant les Tables ℭ ne contiendront aucun composé dont la formule-clé renferme un nombre supérieur à 16.

SYSTÈMES DE PLUS D'UN COMPOSANT

Les *composants* de chaque système sont premièrement disposés d'après l'arrangement type suivant l'ordre A, B, C, etc. Les *systèmes* sont alors arrangés, en accord avec l'arrangement type, dans l'ordre de leurs composants A. Tous les systèmes ayant le même composant A seront trouvés sous ce composant dans l'ordre de leurs composants B, etc.

Dans certaines tables, le plan sera basé sur l'arrangement ℭ au lieu de l'arrangement type. De tels cas seront toujours mentionnés.

Noms Indices (Anglais)

Les formules chimiques de presque tous les composés organiques et les minéraux dont les propriétés sont données dans les T. C. I. peuvent être trouvées au moyen des indices extensifs des noms donnés aux p. 174 et 280.

Si l'on ne trouve pas le nom à cette place, il faudra consulter d'autres ouvrages de références pour la formule. Il faut noter, cependant, que la formule exacte n'est pas nécessaire. Le composé peut être immédiatement situé si l'on ne connait que les éléments qui le composent (dans le cas des composés inorganiques), ou que les nombres des atomes de C (dans le cas des composés organiques); à la seule condition que le lecteur puisse reconnaître ou le nom ou la formule lorsqu'il la voit.

PHYSICAL PROPERTIES OF CHEMICAL SUBSTANCES

INTRODUCTION

The following tables (p. 96 to 314) are intended to serve as a source of ready reference for the *approximate* values of certain properties of chemical substances, displayed in such a manner as to be of the greatest utility. The values given may be uncertain by one or more units in the last significant figure. Non-significant figures are given in small type. Thus, 2300 indicates that the correct value lies between 1800 and 2800, with 2300 as most probable value.

More accurate values for these properties, if known, will be found in subsequent sections of I. C. T, together with their literature references.

𝔄. ELEMENTARY SUBSTANCES AND ATMOSPHERIC AIR

𝔄-Tables, p. 102. Values in parentheses are estimated, usually with the aid of the Periodic Law.

𝔅. CHEMICAL COMPOUNDS. STANDARD ARRANGEMENT (*v.* p. 96)

𝔅-Tables, p. 106

1. Formula or formula and name.
2. Gram-formula-weight. (I. C. T. atomic weights, *v.* p. 43.)
3. Crystal system.
   𝔅-Table.
   Special tables.

PROPRIÈTÈS PHYSIQUES DES SUBSTANCES CHIMIQUES

INTRODUCTION

Les tables suivantes (p. 96 à 314) ont été établies dans le but de servir de source de référence rapide pour les valeurs *approximatives* de certaines propriétés des substances chimiques, et sont disposées de manière à être de la plus grande utilité possible. Les valeurs données puivent être incertaines par une ou plusieurs unités de leur dernier chiffre significatif. Les chiffres non significatifs sont donnés en petits caractères. Ainsi, 2300 indique que la valeur correcte se trouve entre 1800 et 2800, avec 2300 comme valeur la plus probable. Si l'on connait des valeurs plus précises pour ces propriétés, on les trouvera dans les sections suivantes des T. C. I., accompagnées de leurs références bibliographiques.

𝔄. SUBSTANCES ÉLÉMENTAIRES ET AIR ATMOSPHÉRIQUE

Tables 𝔄, p. 102. Les valeurs entre parenthèses sont estimées ordinairement à l'aide de la Loi périodique.

𝔅. COMPOSES CHIMIQUES. ARRANGEMENT TYPE (*v.* p. 96)

Tables 𝔅, (p. 106)

1. Formule ou formule et nom.
2. Poids moléculaire en grammes (Poids atomiques des T. C. I., *v.* p. 43.)

in den 𝔅-Tabellen nur die Verbindungen des U, Th und Ra enthalten. Für die anderen siehe Seite 364. In einigen 𝔅-Tabellen, dort wo die Schlüsselnummern mit 16 beginnen, findet man häufig nur einige wenige einfache Verbindungen. Der Leser wird dann auf die ℭ-Tabellen verwiesen, wo die restlichen derartigen Verbindungen gefunden werden können. Diese Tabellen sind nach anderen Gesichtspunkten zusammengestellt. Es ist das die

ℭ-Anordnung (ℭ-Arrangement)

Bei dieser Anordnung sind die Verbindungen nach ihrer empirischen Formel gegeben (einschliesslich Kristallwasser) und zwar in der Ordnung C, H, die restlichen Zeichen dann in alphabetischer Ordnung, z.B. $C_6H_4I_2O_3S$. Die ℭ-Tabellen enthalten jedoch keine Kohlenstoffverbindung, in deren Schlüsselformel eine Zahl grösser als 16 vorkommt.

SYSTEME MIT MEHR ALS EINER KOMPONENTE

Die Komponenten jedes einzeln Systemes sind zuerst in der Reihenfolge A, B, C, u. s. w., entsprechend des "Standard-Arrangement" anzuordnen. Die Systeme sind dann, entsprechend des "Standard-Arrangement," in der Reihenfolge ihrer A-Komponenten angegeben. Alle Systeme, welche dieselbe A-Komponente haben, werden unter dieser Komponente in der Reihenfolge ihrer B-Komponenten gefunden.

In gewissen Tabellen wird dieser Plan entsprechend der ℭ-Anordnung, an Stelle des "Standard Arrangement," gewählt. Solche Fälle werden immer entsprechend bemerkt.

Namenverzeichnis (Englisch)

Die chemischen Formeln von so ziemlich allen organischen Verbindungen und Mineralien, deren Eigenschaften in den I. C. T. enthalten sind, konnen mit Hilfe des ausgedehnten Namenverzeichnisses auf Seite 174 und 280 gefunden werden. Ist der Name hier nicht auffindbar, so müssten andere Quellen für die Formel nachgesehen werden. Es soll aber bemerkt werden, dass eine genaue Formel nicht nötig ist. Die Verbindung kann bei anorganischen Verbindungen leicht aufgefunden werden, wenn nur die Elemente, die sie zusammensetzen, bekannt sind, bei organischen Verbindungen, wenn nur die Zahl der Kohlenstoffatome bekannt ist. Nötig ist es, dass der Leser entweder den Namen oder die Formel beim Ansehen erkennt.

DIE PHYSIKALISCHEN EIGENSCHAFTEN CHEMISCHER STOFFE

EINFÜHRUNG

Die folgenden Tafeln (s. 96 bis 314) sollen zur raschen Orientierung über angenäherte Werte gewisser Eigenschaften chemischer Verbindungen dienen. Sie sind in einer solchen Art angeordnet, um vom grösstmöglichem Nutzen zu sein. Die angegebenen Werte können auf einer und mehreren Stellen der letzten grossgeschriebenen Ziffer unsicher sein. Z.B. sagt die Zahl 2300 aus, dass der zwischen 1800 und 2800 liegende Wert am wahrscheinlichsten 2300 sein wird.

Genauere Werte fur diese Eigenschaften können, wenn sie bekannt sind, in den weiter unten vorhandenen Abschnitten der I. C. T. zusammen mit der Literatur gefunden werden

𝔄. ELEMENTARE STOFFE UND DIE ATMOSPHÄRISCHE LUFT

𝔄-Tabellen, Seite 102. Werte, die in den Klammern sich befinden, sind geschätzt gewöhnlich nach dem periodischem System der Elemente.

𝔅. CHEMISCHE VERBINDUNGEN. NORMAL-ANORDNUNG [STANDARD-ARRANGEMENT] (siehe S. 97)

𝔅-Tabellen, Seite 106

1. Formel oder Formel und Name.
2. Gramm-Formel-Gewicht (Atomgewichte der I. C. T. siehe S. 43.)

sarà rimandato a una tabella ℭ dove si troveranno gli altri disposti con criterio differente che viene chiamato

La Disposizione ℭ

Secondo questa i composti sono disposti in base alle formule empiriche (*compresa* l'acqua di cristallizzazione) nell'ordine C, H e con i rimanenti simboli ordinati alfabeticamente P. es. $C_6H_4I_2O_3S$. Le tabelle ℭ non comprendono però composti del carbonio che hanno un numero chiave piu grande di 16.

SISTEMI DI PIU' D'UN COMPONENTE

I *componenti* di ciascun sistema sono dapprima disposti secondo la disposizione tipo, nell'ordine A, B, C, etc. I *sistemi* sono quindi disposti, secondo la disposizione tipo, nell'ordine dei loro componenti A. Tutti i sistemi aventi lo stesso componente A verranno trovati, sotto questo componente, nell'ordine dei loro componenti B, etc.

In alcune tavole il piano sara' basato sulla disposizione ℭ in luogo della disposizione tipo. Di cio' verra' sempre fatta menzione.

Indici Per Nome (Inglese)

Le formule chimiche di quasi tutti i composti organici e minerali di cui sono riportate le proprietà nelle T. C. I. si possono trovare con l'aiuto di estesi indici di nomi dati a p. 174, e 280. Se negli indici non si trova il nome bisogna consultare altre opere per trovare la formula. Deve tuttavia notarsi che non è necessaria la formula esatta. Il composto può essere facilmente ritrovato se si conoscono solo gli elementi componenti (nel caso di composti inorganici) o se si conosce solo il numero di atomi di carbonio (nel caso di composti organici) purchè il lettore sia in grado di riconoscerne il nome o la formula quando li vede.

PROPRIETA' FISICHE DELLE SOSTANZE

INTRODUZIONE

Le tabelle seguenti (p. 96 a 314) hanno lo scopo di fornire per una serie di sostanze valori *approssimati* di certe proprietà disposti in modo da essere della più grande utilità. I valori riportati pòs sono essere incerti per una o più unità nelle ultime cifre significative. Le cifre non significative sono indicate in caratteri piccolli. Così 2300 indica che il valore esatto si trova fra 1800 e 2800, e che 2300 è il valore più probabile.

Valori più precisi di queste proprietà quando sono conosciuti, sono riportati nelle sezioni successive delle T. C. I. insieme con le relative indicazioni bibliografiche.

𝔄. SOSTANZE ELEMENTARI ED ARIA ATMOSFERICA

Tabelle 𝔄, p. 102. I valori fra parentesi sono calcolati generalmente con l'aiuto della legge periodica.

𝔅. COMPOSTI, DISPOSIZIONE STANDARD (*v.* p. 97)

Tabelle 𝔅, p. 106

1. Formula oppure formula e nome.
2. Peso della formula in grammi. (T. C I. pesi atomici *v.* p. 43.)
3. Sistema cristallino.
   Tabella 𝔅.
   Tabelle speciali.
4. Punto di fusione. (Alla pressione di una atmosfera, tranne che non sia diversamente indicato dalla soprascritta; così $125^{17 atm.}$ = fonde a 125° alla pressione di 17 atmosfere.)
   Tabella 𝔅

4. **Melting point.** (Under 1 atm. unless otherwise indicated by superscript, thus $125^{17 atm.}$ melts at 125° under 17 atm.)
   𝔅-Table.
5. **Boiling point.** (Under 760 mm Hg unless otherwise indicated by superscript, thus 321^{125} = boils at 321° under 125 mm Hg.)
   𝔅-Table.
6. **Density**, g cm^{-3}. (At 20° unless otherwise indicated by superscript, thus 1.853^{40} = 1.853 g cm^{-3} at 40°C.)
   𝔅-Table.
7. **Refractive index and dispersion**, (n_D and $H_\beta - H_\alpha$) for 20° unless otherwise indicated.

ABBREVIATIONS AND CONVENTIONS

at. or atm.	atmosphere
C.	cubic or regular
d.	decomposes, *e.g.*, d. 335 = decomposes at *ca.* 335°; 335 d. = melts (resp. boils) at 335° with decomposition
diss.	a dissociation temperature
exp.	explodes
l.	liquid
H.	hexagonal
M.	monoclinic
P.	under pressure
s.	sublimation
s. d.	slight decomposition
R.	rhombic or orthorhombic
Tet.	tetragonal
Tr.	transition temperature
Tri.	triclinic
Trig.	trigonal
vac.	*in vacuo*
var.	variable

THE PROPERTY-SUBSTANCE TABLES

Following the General Tables will be found (p. 306) the Property-substance Tables, in each of which the substances, identified by Index Number, are arranged in ascending order of the values of the property, the intervals on the scale of values of the property being given in black-face type.

To Identify a Substance by Means of Its Properties.—*Example:* A liquid is found to have the following properties: B. P. = 81.1° at 745 mm, d = 0.783, n_D = 1.347. What is the substance? With the aid of Craft's rule, first correct the boiling point to 760 mm. If the general nature of the substance is unknown, put c = 10^{-4} in the Craft's equation, $\Delta t = cT_B(760 - P)$. Thus in the present instance, we should have $\Delta t = 10^{-4} \times (81.1 + 273)(760 - 745) = 0.3°$, and $t_B = 81.1 + 0.3° = 81.4°$. Next turn to the special B. P. (p. 310), d (p. 313), and n (p. 276) tables and read off from these tables the index numbers of substances having values of the above properties in the neighborhood of those for the unknown substance. Thus, for the present example, the following index numbers will be obtained: For B. P., 130, 758, 727, 1612, 168, 277, 1535, 506, 792; for d, 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; for n_D, 141, 168, 213. The only index number common to each of these properties is 168; and on turning to this index number in the General ℭ-Table, we can readily identify our substance as acetonitrile. The identification can then be further checked by appropriate chemical tests, if desired.

3. **Système cristallin.**
   Table 𝔅.
   Tables spéciales.
4. Point de fusion. (Sous 1 atm. à moins d'une indication par exposant, ainsi $125^{17 atm.}$ = fond à 125° sous 17 atm.)
   Table 𝔅.
5. Point d'ebullition. (Sous 760 mm Hg à moins d'une indication par exposant, ainsi 321^{125} = boût à 321° sous 125 mm Hg.)
   Table 𝔅.
6. Densité, g cm^{-3}. (A 20° à moins d'une indication par exposant, ainsi $1{,}853^{40}$ = g cm^{-3} à 40°C.)
   Table 𝔅.
7. Indice de réfraction, et dispersion (n_D et $H_\beta - H_\alpha$) à 20° à moins d'une indication.

ABRÉVIATIONS ET CONVENTIONS

at. ou atm.	atmosphère
C.	cubique ou régulier
d.	Se décompose, par ex., d. 335 = se décompose à *environ* 335°; 335 d. = fond (resp. bout) à 335° avec décomposition
diss.	une température de dissociation
exp.	exploser
l.	liquide
H.	hexagonal
M.	monoclinique
P.	sous pression
s.	sublimation
s d.	légère décomposition
R.	rhombique ou orthorhombique
Tet.	tétragonal ou quadratique
Tr.	température de transition
Tri.	triclinique
Trig.	trigonal
vac.	dans le vide
var.	variable

TABLES DES PROPRIÉTÉS DES SUBSTANCES

On trouvera (p. 306) à la suite des Tables générales, les Tables des Propriétés des Substances, dans chacune desquelles, les substances identifiées par leur Nombre-Index, sont arrangées dans l'ordre ascendant des valeurs de la propriété; les intervalles de l'échelle des valeurs de la propriété sont donnés en caractères gras.

Pour identifier une substance au moyen de ses propriétés.—*Exemple*: On a trouvé qu'un liquide a les propriétés suivantes: P.E. = 81.1° à 745 mm, d = 0.783, n_D = 1,344. Quelle est la substance? Au moyen de la règle de Craft, on corrige premièrement le point d'ébullition à 760 mm. Si la nature générale de la substance est inconnue, on pose c = 10^{-4} dans l'équation de Craft, $\Delta t = cT_E(760 - P)$. Ainsi dans le cas présent, nous aurions $\Delta t = 10^{-4} \times (81.1 + 273)(760 - 745) = 0.3°$, et $t_E = 81.1° + 0.3° = 81.4°$. Ensuite on cherche dans les tables spéciales des P.E. (p. 310), des d (p. 313) et des n (p. 276) et on note les nombres-index des substances ayant les valeurs des propriétés ci-dessus dans le voisinage de celles de la substance inconnue. Ainsi, pour l'exemple présent, les nombres-index suivants seront obtenus; Pour le P.E., 130, 758, 727, 1612, 168, 277, 1535, 506, 792; pour d, 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; pour n_D, 141, 168, 213. Le seul nombre-index commun à chacune de ces propriétés est 168; en revenant à ce nombre-index dans la Table générale ℭ, et en notant les autres propriétés, on peut rapidement identifier notre substance comme étant acétonitrile. L'identification peut être alors poussée plus loin au moyen d'essais chimiques appropriés, si on le désire.

3. Kristall-System

𝔅-Tabellen.

Besondere Tabellen.

4. Schmelzpunkt. (Bei 1 Atmosphäre: wird dem Werte eine Zahl rechts hinaufgesetzt, so bedeutet diese den Druck unter welchem der Schmelzpunkt angegeben ist. Es bedeutet 125^{17atm}: der Schmelzpunkt ist bei einem Druck von 17 Atm. bei 125°.)

𝔅-Tabellen.

5. Siedepunkt. (Unter 760 mm Quecksilber: wird dem Werte eine Zahl rechts hinaufgesetzt, so bedeutet diese Zahl den Druck, unter welchem der Siedepunkt angegeben ist. Es bedeutet 321^{125}; der Siedepunkt liegt bei einem Druck von 125 mm Hg bei 321°.)

𝔅-Tabellen.

6. Dichte, g cm^{-3}. (Bei 20°C: wird dem Wert eine Zahl rechts hinaufgesetzt, so bedeutet diese Zahl die Temperatur, für welche die Dichte angegeben ist. Es bedeutet 1.853^{40}: die Dichte bei 40° beträgt 1.853).

𝔅-Tabellen.

7. Brechungs-Index und Dispersion, (n_D und $H_\beta - H_\alpha$) für 20°, wenn nichts anderes angegeben ist.

ABKÜRZUNGEN UND ZEICHEN

at. oder atm.	Atmosphäre
C.	kubisch oder regulär
d.	zersetzt sich, z. B. d335 bedeutet, zersetzt sich bei *ungefähr* 335°; 335d bedeutet, schmilzt (oder siedet) bei *ungefähr* 335° unter Zersetzung
diss.	Dissoziations Temperatur
exp.	explodiert
l.	flüssig
H.	hexagonal
M	monoklin
P.	unter Druck
s.	Sublimation
s.d.	schwache Zersetzung
R.	rhombisch oder orthorhombisch
Tet.	tetragonal
Tr.	Umwandlungstemperatur
Tri.	triklin
vac.	im Vacuum
var.	variabel

STOFF-EIGENSCHAFTS TAFELN

Den Haupttabellen folgend, findet man Seite 306 Stoff-Eigenschafts Tafeln. In jeder dieser Tafeln, in welcher die Stoffe durch ihre Indexzahlen bezeichnet sind, werden die Stoffe in aufsteigender Ordnung der Werte dieser Eigenschaften dargestellt. Die Intervalle an der Scala der Eigenschaftswerte sind in fettgedruckten Ziffern angegeben.

Die Erkennung eines Stoffes mit Hilfe seiner Eigenschaften.— *Beispiel:* Es ist eine Flüssigkeit gefunden, welche folgende Eigenschaften hat: Siede-Punkt 81.1° bei 745 mm, $d = 0.783$, $n_D = 1.344$. Welcher Stoff ist das? Mit Hilfe der Regel von Craft corrigiere man zuerst den Siede-Punkt auf 760 mm. Ist die allgemeine Natur des Stoffes nicht bekannt, setze man $c = 10^{-4}$ in die Gleichung von Craft ein: $\Delta t = cT_B(760 - P)$. Im gegenwärtigen Falle ist also $\Delta t = 10^{-4} \times (81.1 + 275)(760 - 745) = 0.3°$, wonach dann der Siede-Punkt $t_B = 81.1° + 0.3° = 81.4°$ sich ergibt. Dann verwende man die Sd.P. Tabellen (Seite 310), die *d*-Tabellen (Seite 313) und die *n*-Tabellen (Seite 276), suche in diesen die Indexzahlen jener Stoffe heraus, deren oben genannte Eigenschaften solche Werte haben, die in der Nähe der Eigenschafts Zahlen des unbekannten Stoffes liegen. So erhält man für das gewählte Beispiel, folgende Indexnummern: für Sd. P. 130, 758, 727, 1612, 168, 277, 1535, 506, 792, für *d*, 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; für n_D 141, 168, 213. Die einzige Index-Nummer, die alle drei Eigenschaften vereinigt, ist 168. **Diese Index-Nummer wird in der Haupt ℭ-Tabelle aufgesucht; mit Beachtung noch anderer Eigenschaften kann man leicht die Flüssigkeit als Azetonitril erkennen. Die Identifizierung kann dann noch weiter durch eine chemische Untersuchung, wenn nötig, bestätigt werden.**

5. Punto di ebollizione. (Alla **pressione di 760 mm Hg** tranne che non sia altrimenti indicato dalla **soprascritta; così** 321^{125} = bolle a 321° alla pressione di 125 mm Hg.)

Tabella 𝔅.

6. Densità, g cm^{-3} (A 20°, tranne che non **sia altrimenti** indicato dalla soprascritta; così 1.853^{40} = 1.853 g cm^{-3} a 40°C.)

Tabella 𝔅.

7. Indice di rifrazione e dispersione (n_D e $H_\beta - H_\alpha$) **per 20°** tranne che non sia altrimenti indicato.

ABBREVIAZIONI E CONVENZIONI

at oppure atm.	atmosfera
C	cubico o regolare
d.	si decompone; per es. d335 = **si decompone a** *ca.* 335°; 335d = fonde (o bolle) **a 335° con** decomposizione
diss.	una temperatura di dissociazione
exp.	esplode
l.	liquido
H.	esagonale
M.	monoclino
P.	sotto pressione
s.	sublimazione
s.d.	leggera decomposizione
R.	rombico od ortorombico
Tet.	tetragonale
Tr.	temperatura di trasformazione
Tri.	triclino
Trig.	trigonale
vac.	nel vuoto
var.	variabile

LE TABELLE DELLE PROPRIETA' DELLE SOSTANZE

Seguendo le tabelle generali si troveranno (p. 306) **le tabelle** delle proprietà in ciascuna delle quali le sostanze, **indicate col** numero indice, sono disposte secondo l'ordine **ascendente dei** valori della proprietà. Gli intervalli nella scala **dei valori della** proprietà sono indicati in grassetto.

Identificazione di una sostanza a mezzo delle sue proprietà.— *Esempio:* si supponga che un liquido abbia le seguenti proprietà: B.P. = 81.1° a 745 mm, $d = 0.783$, $n_D = 1.344$. Che sostanza è? Con l'aiuto della regola di Craft, bisogna anzitutto ridurre il punto di ebollizione a 760 mm. Se non si conosce la natura della sostanza bisogna mettere, nella equazione di Craft, $c = 10^{-4}$, $t = cT_B(760 - P)$. Così, nel caso nostro, si avrebbe $t = 10^{-4} \times (81.1 + 273)\ (760 - 745) = 0.3°$, e $t_B = 81.1° + 0.3° = 81.4°$. Dopo bisogna guardare alle tabelle speciali per il B. P. (p. 310), per *d* (p. 313) e per *n* (p. 276), e ricavare da queste tabelle i numeri indici delle sostanze aventi valori delle suddette proprietà vicini a quelli della sostanza sconosciuta. Così, per il nostro esempio, si otterranno i seguenti numeri indici: per B.P., 130, 758, 727, 1612, 168, 277, 1535, 506, 792; per *d*, 208, 168, 395, 506, 3320, 1049, 262, 792, 5156; per n_D 141, 168, 213. L'unico numero indice comune a ciascuna di queste proprietà è 168; tornando a questo numero indice nella Tabella Generale ℭ, e osservando le altre proprietà, si può prontamente identificare la sostanza nel acetonitrile.

La identificazione può quindi essere ulteriormente comprovata da appropriati saggi chimici, se si desidera.

ELEMENTARY SUBSTANCES AND ATMOSPHERIC AIR. λ-TABLE

THE GASEOUS STATE

Chem. symb.	Standard density 0°, 1A, g l⁻¹	Density of the saturated vapor at the normal boiling point g l⁻¹	Critical constants			Specific heat joules per gram atom at 15°	Viscosity $\eta = A \times 10^{-6}$ poises	
	d_0	d_s	t_c °C	p_c atm	d_c g cm⁻³	C_p	A	t
A	1.7824	5 89	−122 4	48 0	0 531	20 2	221	20
As			>1400					
Br			302		1 18		155	20
Cl	3.214		144	76	0 573	17 2	132	20
F	1.695							
H	0.08987	1 33	−239.9	12 8	0 0310	14 55	88.7	20
He	0 1785	(11 2)	−267.9	2 26	0 069	20 9	197	20
Hg		0 020 at 320°	1650	3500	5		494	273
I			553.				184	124
Kr	3 708	(8.3)	− 62 6	54.2			248	20
N	1.2506	4 61	−147 1	33.5	0.311	14 56	170 5	23
Ne	0.9002	9 46	−228.7	26 9	0.484		312	20
O	1.4290	4 74	−118 8	49.7	0 430	14 60	203 9	23
O_3	3 03 at −80°		− 5 0	(67)	0 54			
P			721	100				
Rn	9.73	(12 6)	104 4	62 4			229	20
S			1040					
Tl		14 8						
Xe	5 851	(9 7)	16 6	58 2	1 15		225	20
Air	1 2930						284 2	20

THE LIQUID STATE

Chem. symb.	Density g cm⁻³		Thermal expansion $\frac{1}{v}\frac{dv}{dt} = A \times 10^{-6}$		Normal boiling point (s = "solid")	Latent heat of vaporization at t_B Kilo-joules per gram atom (s = "solid")
	d	t	A	at t°	t_B	L_V
A	1.402	−185 7	4500	−183	−185 7	6 3
Ac					(>1700)	
Ag	9 4	960	110	960–1200	1950	249
Al	2.40	658	113	658–1100	1800	225.
As					615 s	139 s
Au	17.	1063			2600	368
B					(2550)	
Ba					1140.	361.
Be					(1500)	
Bi	10.1	270.	122	270–630	1450	193.
Br	3.119	20	1100	0–30	58 78	15 0
C					4200	600
Ca					1170	399.
Cb					(>3300)	
Cd	8 0	320	150	320–540	767	107.
Ce					1400	
Cl	1.557	− 33 6	1500	−34	−34 6	10.0
Co					2900	380
Cr					2200	320
Cs	1 84	26	370.	27–123	670	73.
Cu	8.3	1083.	190.	1083–1295	2300.	467.
F	1.11	−187.	3000	−200	−187.	(6.)
Fe	6 9	1530			3000.	380.
Ga	6 095	29.7			>1600	
Ge					(2700.)	(500.)
H	0 0709	−252 7	13000	−255	−252.7	0.450
He	0 126 0.147 d_{max}	−268 9 −270 8			−268.9	0.10
Hf					(>3200.)	
Hg	13 546	20	182	20	356 90	59.3
I	4.00	107.	800	107–150	184.35	22.0
In					>1450.	
Ir					(>4800)	
K	0.83	62.	290	62–150	760.	84.
Kr	2 6	146.			−151.8	(9.4)
La					1800.	
Li			180	186–230	>1200.	(170.)
Mg	1 57	650	380	650–800	1110.	262.
Mn					1900.	240.
Mo					3700.	710.
N	0 808	−195 8	6000	−195	−195 8	2.80
Na	0.93	97.5	280	100–200	880	105.
Ne	1 204	−245 9			−245.9	1.74
Ni					2900.	380.
O	1 14	−183.	4100	−195	−183 00	3.415
O_3	1.71	−183.	2000	−183	−112.	4.88
Os					(>5300.)	
P	1 745	44.5	520	50–60	280.	
Pa					(6200.)	
Pb	10 3	327.	120	327–825	1620.	193.
Pd	11.	1550.			2200.	
Pt	19.	1755.			4300.	520.
Ra					(1140.)	
Rb	1.475	38.5	340	40–140	700.	74.
Rh					(>2500.)	
Rn	4.4	−62.			−61 8	(18 1)
Ru					(>2700.)	
S	1.808	115.	430	115	444 6	8.98
Sb	6.55	631.	100	630–1050	1380.	190.
Sc					(2400)	
Se					688	31.
Si					2600	170?
Sn	6 98	232.	100	232–1600	2260	325.
Sr					1150.	383.
Ta					(>4100)	
Te					1390.	85.
Th					(>3000)	
Ti					(>3000.)	
Tl	11.0	300.	140	300–350	1650.	120? 256?
V					(3000.)	
W					5900.	910.
Xe	3 06	−109 1			−109.1	(13.4)
Yt					(2500)	
Zn	6.7	463	150	419–543	907.	99.2
Zr					(>2900.)	
87					(620.)	(69.6)
85					(520)	(83.7)

AIR

Mole % O_2 in liquid	d	t	A at $t°$		t_B	L_v
10	0.83_1	−195.0			−195.0	
20	$.85_6$	−194.3			−194.3	
20.94	$.86_1$	−194.2			−194.2	0.18_5 (per gram)
30	$.89_3$	−193.5			−193.5	
40	$.93_2$	−192.6			−192.6	
50	$.97_4$	−191.5			−191.5	

Chem. symb.	Specific heat joules per gram atom		Electrical resistivity ohm-cm $R = A \times 10^n$		
	C_p	t	A	n	t
A	22.4	−100.			
Ag	33.8	907–1100	17.0	−6	1000
Al	28	660	20.1	−6	657
Au	27.	1100	30.8	−6	1063
Bi	31.	400	127		269.
Br	36.	13–45	7.8	12	17
Cd	36	321	34	−6	400
Cl	33.5	0–24	>10	15	−70
Cs	32.	50	36.6	−6	28
Cu	27.	1084	21.3	−6	1083
Ga	23	119	27	−6	30
H	0.975	−252			
Hg	27.9	20	95.8	−6	20
I	8.01	114–185	78	6	110.5
In			29.	−6	155
K	30.	63	13	−6	62
Li			45.	−6	230
N	27.8	−200			
Na	32	100	9.7	−6	100.
Ni	33	1452	109		1500
O	26.4	−200			
P			2.3	6	25.
Pb			98.	−6	400.
Rb	3_2.	50	23.5	−6	50.
S	30.4	100	95	10	115.
Sb	28	630	12	−6	860.
Se			$76._6$	−9	390.
Sn	31.	232	49.	−6	300.
Tl			74.	−6	300.
Zn			43	−6	440.
Air	1.91*	−200			

* Per gram, for liquid containing 20.94 mole % O_2

SURFACE TENSION

Chem. symb.	γ dyne cm^{-1}	t	Chem. symb.	γ dyne cm^{-1}	t
A	$12._5$	−185.8	N	8.8_5	−195.8
Al	52_0	75_0	O	$13._2$	−183.
Bi	37_6	300	Pb	44_2.	350.
Br	36	58.6	S	60.	120.
Cd	62_8.	350	Se	72.	217.
Cl	27	−34.5			
Ga	358	30(CO_2)	Air, with 50 mole % O_2	11.6	−190.3
H	1.91	−252.7			
Hg	47_6	20			

REFRACTIVE INDEX

Chem. symb.	n_D	t	Chem. symb.	n_D	t
B	2.5*		N	1.205_8	−190.
Br	1.661	15	Na	0.0045	
Cd	0.82*		O	1.221	−181.
Cl	1.385	20.	Pb	2.6*	
H	1.097*	−252.8	S	1.929	110.
Hg	1.6–1.9	20	Se	2.9	220.
N	1.197_5*	−195.8	Sn	2.1	

* These values are for the Hg line 5790 Å.

THE CRYSTALLINE STATE

Chem. symb. (At. wt. v. p. 43)	Crystal system or form	Density, g cm^{-3}		Thermal expansion $\frac{1}{l}\frac{dl}{dt} = A \times 10^{-6}$		Melting point °C	Specific heat joules per gram atom 1 joule = 4.185 cal.		Latent heat of fusion at t_F Kilo-joules per gram atom	Electrical resistivity ohm–cm $R = A \times 10^{-6}$	
		d	t	A at $t°$		t_F	C_p at $t°$		L_F	A	t
A	C.	1.65	−233			−189.2	25.9	−223	1.12		
Ac						(18_{00})					
Ag	C.	10.5	20	18.9	20	$960._5$	25.2	20	11	1.62	20
Al	C.	2.702	20	23.03	20	$660._0$	24.2	20	8.0	2.62	20
As	Met.H.	5.7		4.7	20	814^{36atm}	25.8	0–100		35	0
	Black	4.7	20				27.0	0–100			
	Yel. C.	2.0	20								
Au	C.	19.3	20	14.2	20	$1063._0$	25.7	18	13.3	2.4	20
B		2.		2		23_{00}.	14	0–100		1.8×10^{12}	0
Ba		3.5	20			850.					
Be	H.	1.8	20			13_{50}.	16.1	0–100	1_2	$18._5$	20
Bi	H.	9.80	20	13.3	20	271	25.6	20	10.9	115	20
Br	R.	($3._4$)				−7.2	23.5	−192 to −108	5.4	$>10^{14}$	
C	Dia. C.	3.51	20	0.9	20		6.1	20		5×10^{20}	15
Graphite	C.	2.25_5	20	3	20	35_{00}.	8.5	20		14_{00}.	20
Graphite	Single crystal									39–60	20

THE CRYSTALLINE STATE.—(*Continued*)

Chem. symb.	Crystal system	d	t	A at t°		t_F	C_p at t°		L_F	A	t
Ca	C.	1.5_5	20	25	0–21	810	26.0	20		4.6	20
Cb		$8._4$	20			195_0					
Cd	H.	8.6	20	29.8	20	320.9	28	20	$6._2$	$7._5$	20
Ce	C.	6.90	20			640	24.8	0–100		78	20
	H.	(6.7)									
Cl	R.	$(1._9)$				−101.6	28	−113	3.40		
Co	C.	8.9	20	12.3	20	1480	24.8	20	14.4	9.7	20
Cr	C.	7.1		8.2	20	161_5	23	20	$6._9$	2.6	0
Cs		1.90	20	97	0–26	26	29	20	$2._1$	20	20
Cu	C.	8.92	20	16.6	20	1083	24.5	20	11.5	1.69	20
F		$(1._3)$				-22_3			(0.8)		
Fe	C.	7.8_6	20	11.7	20	153_5	24.9	20	11.2	10.0	20
Ga	Tet.	5.9_1	20	18	0–30	29.7_5	23	12–23	5.5_5	53	0
Ge	C.	5.3_6	20			$958._5$	22.3	0–100		89×10^3	0
H	C.	0.0808	−262			-259.1_4	2.4	−260.6	0.059		
He						< −272.2					
Hf						(1_{700})					
Hg	H.?	14.19	−38.9	9_0	−190 to −40	-38.8_7	28.0	−40	2.33	21.3	−50
I	R.	4.93	20	93	20–100	113.5	27.8	20	8.3_8	$1._3 \times 10^{15}$	20
In	Tet.	7.3	20	33	20	155	27.3	0–100		9	20
Ir	C.	22.4	20	6.5	20	235_0	26.1	0–100		6	20
K	C.	0.86	20	83	20	$62._3$	29	14	2.3_8	7.0	20
Kr		(2)				−169			(1.5)		
La		6.1_5	20			82_6	26	0–100		59	18
Li	C.	0.53	20	56	20	186	23	0	$(3._5)$	9.3	20
Ma						(2_{300})					
Mg	H.	1.74	20	25.6	20	651	25	20	7.13	4.46	20
Mn		7.2	20	23	20	126_0	24.6	0	8.4	$_5$	
Mo	C.	$10._2$		4	20	$262_0 \pm 10$	26	20–100		4.7_7	20
N	C.	1.026	−252.5			-209.8_6	23	−212	0.35_6		
Na	C.	0.97	20	71	20	97.5	28.4	20	2.6_5	4.6	20
Nd		6.9	20			840	27	0–100		7_9	20
Ne		$(1._0)$				−248.67			(0.2_4)		
Ni	C.	8.90	20	12.8	20	1452	25.8	20	18.1_7	6.9	20
O	H.	1.426	−252.5			−218.4	22.5	−221.8	0.22		
O_3	Ozone					−251.					
Os	H	22.48	20	6.1	20	27_{00}.	25	20–100		9	20
P	Yel. H.	1.82	20	12_5	0–40	44.1	23	9	0.654	10^{17}	11
	Red, C.	2.20	20			$590^{43\,atm}$	24	−21 to +7			
	Black									$71_0 \times 10^3$	0
Pb	C.	11.34	20	29.1	20	327.5	26.5	20	4.70	21.9	20
Pd	C.	12.0	20	11.8	20	1555	26.2	18	1_6	10.8	20
Po						(1_{800})					
Pr		6.5	20			940	27	0–100		88	18
Pt	C.	21.45	20	8.9	20	175_5	26.5	20	22	10.5	20
Ra		(5.)				(9_{60})					
Rb		1.53	20	90	20	$38._5$	28.7	0	2.1_8	$12._5$	20
Re						(3_{000})					
Rh	C.	12.5	20	8.4	20	195_5	25	0–100		5.1	20
Rn		$(_4.)$				−71			$(3._{25})$		
Ru	H.	12.2	20	9.1	20	245_0	26	0–100		10	20
S	R.	2.07	20	64	40	112.8	23	0–30		2×10^{23}	20
	M.	1.96	20			119.0	24	0–30	1.1_8		
Sa		$7._7$				$>1_{300}$					
Sb	H.	6.684	25	11.4	20	630.5	25	20	19.5	39	20
Sc		$(_2.{}_5)$				12_{00}					
Se	Gray, Trig.	4.80	25	37	40	220	28	0–41	$(2._2)$	1.2	20
	Red, H.?	4.50	25								
Si	C.	2.4	20	2.8 7.3	20	14_{20}	20.7	20		$8_5 \times 10^3$	20
Sn	White, Tet.	7.31	20	20	20	231.8_5	26.9	18	(7.)	11.4	20
	Gray, C.?	5.75_0	20	5	−163 to −18		25.6	20			

THE CRYSTALLINE STATE.—(*Continued*)

Chem. symb.	Crystal system	*d*	*t*	*A* at *t*°		t_F	C_p at *t*°		L_F	*A*	*t*
Sr		2 6				800				23	20
Ta	C.	16 6		7	20	2850	27	20		15	20
Te	α Met. H.?	6 24	20	16 8	40	452	25	20	3 9	[5.8 – 33 × 10³]	
	β H.?	6 00	20								
Th	C.	11 2				1845	26 8	0-100		18	20
Ti	C.	4 5	20			1800	29	0-100		3	20
Tl	Tet.	11 85	20	28	20	303 5	26 6	20	6 15	18 1	20
U		18 7				<1850	28	0 100		60	20
V	C.	5 96				1710	24 6	0 100			
W	C.	19 3		4	20	3370	26	20 100		5 48	20
Xe		(2 7)				–140			(2 05)		
Yt		5 51				1490					
Zn	H.	7 140	20	33	20	419 43	25 3	20	7.1	6	20
Zr	C.	6 4	20			1700	25 2	0 100		170	0
85						(470)					
87						(23)					

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CHEMICAL COMPOUNDS

𝔅-TABLE

Compiled with the cooperation of Raleigh Gilchrist, F. W. Smithers and Edward Wichers, Bureau of Standards, Washington D. C ; J. A. Almquist, J. M. Braham and E. W. Guernsey, Fixed Nitrogen Laboratory, Washington, D. C.; H. E. Merwin, H. S. Roberts, R. B. Sosman and E. G. Zies, Geophysical Laboratory, Washington, D. C.; John C. W. Frazer, F. O. Rice and H. C Urey, Johns Hopkins Univ , Baltimore, Md.; Robert D. Coghill, Florence Fenwick, Donald M. Hetler, Norman W. Krase and Hugh M. Spencer, Yale Univ., New Haven, Conn. The list of minerals was supplied by E. T. Wherry, Bureau of Chemistry, Washington, D C.

General index number	Formula	Molecular weight (I. C. T atomic weights, v. p. 43)	Crystal system	Normal melting point, °C	Specific gravity 20°/4° (or at other indicated temperature)	Refractive index finding number, v. p. 165
1	H_2O	18 0154		0	0 917° l. 0 9982	203 8
2	H_2O_2	34 0154		− 1 7	1 $643_4^{-4.46}$ l. 1 442	 16
3	$H_2O_2 2H_2O$	70 0462		− 51		
4	HF.	20 0077		− 83	l. 0 $988^{13 6}$	
5	$Cl_2.8H_2O$	215 039	R.	d. 9 6	1 23	
6	ClO_2	67 4580		− 76		
7	Cl_2O	86 9160		− 20?		
7 1	Cl_2O_6	166 916		− 1	1 65	
8	Cl_2O_7	182 916				
9	HCl	36 4657		−111	l. 1 $194^{-85 8}$	3
10	$HCl.H_2O$	54 4811		− 15.35	1 48	
11	$HCl.2H_2O$	72 4965		− 17 7	l. 1 $46_4^{18 2}$	
12	$HCl 3H_2O$	92 6119		− 24 4		
13	$HClO_4$	100 466		−112	l. 1 768	
14	$HClO_4.H_2O$	118 481		50	1 88 l. 1 776_4^{50}	
15	$HClO_4 2H_2O$	136 497		− 17 8		
16	$HClO_4.3H_2O$	154 512		− 43 2 (α) − 37 (β)		
17	HBr	80 9237		− 86	l. 2 16^{-68}	5
18	$HBr.2H_2O$.	116 955		− 11	2 11^{-15}	
19	$HBr.3H_2O$.	134 970		− 47 5		
20	$HBr 4H_2O$.	152 985		− 55 8		
21	HBrO	96 9237				
22	$HBrO_3$	128 924		d. 100		
23	BrF_3.	136 916		5		
24	IO_2.	158 932		d. 130	4 2_{10}^{10}	
25	I_2O_5	333 864		d. 300	4 799_4^{25}	
26	HI .	127 940		− 50.8	l. 2 $847^{-4.7}$	27
27	$HI.2H_2O$	145 955		− 43		
28	$HI.3H_2O$	163 970		− 48		
29	$HI.4H_2O$	181 985		− 36.5		
30	HIO_3	175 940	R.	110	4 629^0	
31	HIO_4	191 940				
32	$HIO_4 2H_2O$	227 971	M. ?	d. 110		
33	$I_2O_5 HIO_3$	509 804		Tr. 170		
34	IF_5	221 932		8	l. 3 5	
35	ICl (α)	162 390		27 2	l. 3 24_{24}^{24} 3 182_4^0	
35 1	ICl (β)	162 390	R.	13 9	l. 3.24_{24}^{24} l. 3.182_4^0	
36	ICl_3	233 306	R.	*ca.* 33	3.11^{15}	
37	IBr	206 848		*ca.* 42	4 414^{10}	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
38	SO_2	64 0650		− 72 7		15
39	SO_3	80 0650		16 83	l. 1 923	
40	S_2O_7	176 130		0		
41	H_2S	34 0804		− 82 9	l. 0.96^{-60}	10
42	H_2S_2	66 1454		− 88	l. 1.376	65
43	H_2S_3	98 2104		− 53	l. 1 496^{15}	
44	H_2S_5	162 340			l 1 71^{15}	
45	H_2SO_4	98 0804		10 49	l 1.834	18
46	$H_2SO_4.H_2O$	116 095		8 62	l. 1 842_4^{15}	
47	$H_2SO_4.2H_2O$	134 019		− 38 9	l. 1 650_4^0	
48	$H_2SO_4.4H_2O$	170 142		− 25		
49	H_2SO_5	114 080		45		
50	$H_2S_2O_7$	178 145		35	l. 1 9^{20}	
51	$H_2S_2O_8$	194 145		<60		
52	SF_6	146 065		− 55		
53	SOF_2	86 0650		−110		
54	SO_2F_2	102 065		-120^{45mm}		
55	SCl_2	102 981		− 78	l. 1 621_{15}^{15}	56
56	SCl_4	173 897		− 30		
57	S_2Cl_2	135 046		− 80	l. 1 678	61
58	$SOCl_2$	118 981			l. 1 638	52
59	SO_2Cl_2	134 981		− 54 1	l. 1 667	22
60	$SO_3.SO_2Cl_2$	215 046		− 37 5	l. 1 837	
61	$S_2O_3Cl_4$	253 962	R.	57 d.		
62	SO_2OHCl	116 531		− 80	l. 1 753	20
63	S_2Br_2	223 962		− 46	l. 2 635	64
64	$SOBr_2$	207 897		− 50	l. 2 68^{18}	
65	$SOClBr$	163 439			l. 2 31^0	
66	SeO_2	111 200		340	3 953_{15}^{15}	
67	HSe	80 2077				
68	H_2Se	81 2154		− 64	l. 2 12^{-42}	
69	H_2SeO_3	129 215	H.	d.	3 004_4^{15}	
70	H_2SeO_4	145 215	H.	58	2 950_4^{15} l. 2 608_4^{15}	
71	$H_2SeO_4.H_2O$	161 230		25	2 627_4^{15} l. 2 356_4^{15}	
72	SeF_4	155 200		− 80		
73	SeF_6	193 200				
74	$SeCl_4$	221 032				
75	Se_2Cl_7	229 316			l. 2 $906_4^{17\ 5}$	
76	$SeOCl_2$	166 116		8 5	l. 2 44	
77	Se_2Br_2	318 232			l. 3 604^{15}	
78	$SeOBr_2$	255 032		41 7	l. 3 38^{50}	
79	$H_2SeO_4.SO_3$	225 280		6 6		
80	$H_2SeO_4\ 2SO_3$	305 345		20		
81	$SO_3.SeCl_4$	301 097		165		
82	TeO_2—Tellurite	159 500	Tet. P.		Tet. 5 66^0 R. 5 89^0	1056
83	TeO_3	175 500		d.	5 $08^{10\ 5}$	
84	H_2Te	129 515		− 48	l. 2 57_4^{20}	
85	H_2TeO_4	193 515		d. 160	$3.44^{19\ 2}$	
86	$Te(OH)_6\ (\alpha)$	229 546	C.		3 053	
86.1	$Te(OH)_6\ (\beta)$	229 546	M.		3 071	
87	TeF_6	241 500				
88	$TeCl_2$	198 416		175		
89	$TeCl_4$	269 332		214		
90	$TeCl_4.HCl.5H_2O$	395 875		− 20		
91	$TeBr_2$	287 332		*ca.* 280		
92	$TeBr_4$	417 164		*ca.* 380	4.31_4^{15}	
93	TeI_4	635 228		259	8 403_4^{15}	
94	$2TeO_2.SO_3$	399 065	R.	d. 500	4 7	
95	NO	30 0080		−161	l. 1 $269_4^{150.2}$	7
96	NO_2	46 0080		− 9 3	l. 1 448	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
97	N_2O	44.0160		−102.4	l. 1.226^{-89}	2
98	N_2O_3	76.0160		−102	l. 1.447^{2}	
99	N_2O_4	108.016	R.	30		
100	$2N_2O_5.H_2O$	234.047		5	l. 1.682^{18}	
101	N_4O_6	152.032				
102	NH_3	17.0311		− 77.7	0.817^{-79}	
					l. 0.607	6
103	$H_2N.NH_2$	32.0468		1.4	l. 1.011_4^{15}	28
104	$N_2H_4.H_2O$	50.0622		< − 40	l. 1.03^{21}	
105	N_3H	43.0317		− 80		
106	$NH_3.HN_3$	60.0628		110		
107	$2NH_3.H_2O$	52.0776		− 78		
108	$N_2H_4.HN_3$	75.0785		65		
109	HNO_3	63.0157		− 42	l. 1.502	12
110	$HNO_3.H_2O$	81.0311		− 38		
110.1	$HNO_3.3H_2O$	117.0619		− 18.5		
111	NH_2OH	33.0311		34	1.35	
					l. $1.204_4^{23.5}$	21
112	H_3NO_4	81.0311	R.	− 34		
113	NH_4OH	35.0465		− 77		
114	H_5NO_5	99.0465		− 35		
115	$(OH)_4NON(OH)_4$	180.078		− 39		
116	NH_2NO_2	62.0314		72 d.		
117	NH_4NO_2	64.0468		d.		
118	NH_4NO_3	80.0468	R.	169.6	α 1.66_4^{25}	
					β 1.725_4^{25}	
119	NH_4ONNOH	79.0625		65		
120	$N_2H_4.HNO_3$	95.0625		70.7		
				62.1		
121	$NH_4NO_3.HNO_3$	143.063		12		
122	$N_2H_4.2HNO_3$	158.078		104		
123	$NH_4NO_3.2HNO_3$	206.078		30		
124	$NH_4NO_3.3NH_3$	131.140		*ca.* − 40		
125	NOF	49.0080		−134		
126	NO_2F	65.0080		−139		
127	$NH_4F.HF$	57.0465	R.		l. 1.211^{12}_{12}	
128	$N_2H_4(HF)_2$	72.0622	C.	105		
129	NCl_3	120.382			l. 1.653	
130	$NOCl$	65.4660		− 64.5	l. 1.417^{-12}	
131	NO_2Cl	81.4660		< − 30	l. 1.32^{14}	
132	NH_4Cl—Salammoniac	53.4968	C.		1.536	145
133	$N_2H_4.HCl$	68.5125		89		
134	$N_2H_4.2HCl$	104.978	C.	198	1.42	
135	$NH_4Cl.3NH_3$	104.590		10.7		
136	$NH_4Cl.6NH_3$	155.683		− 18		
137	$NH_2OH.HCl$	69.4968	M.	151	1.67^{17}	
138	NH_4ClO_4	117.497	R.	d.	1.95	489
139	$N_2H_4.HClO_3$	116.513		exp. 80		
140	$N_2H_4.HClO_4.2H_2O$	168.543		132		
141	$NOBr$	109.924		− 55.5		
142	$NOBr_3$	269.756		− 40	l. 2.637	
143	NH_4Br	97.9548	C.		2.548	
144	$N_2H_4.HBr$	112.971		80		
145	$HBr.2NH_3$	114.986				
146	$NH_4Br.3NH_3$	149.048	R.	13.7		
147	$NH_4Br.6NH_3$	200.141		− 20		
148	NH_4I	144.971	C.		2.563	153
149	NH_3I_2	270.895		− 2	l. 2.46^{14}	
150	NH_4I_3	398.835	R.		3.749	
151	$NH_4I.NH_3$	162.002				
152	$N_2H_4.HI$	159.987		exp. 127		
153	$N_2H_4.2HI$	287.926		220		
154	$NI_3.NH_3$	411.835		d. > 20	3.5	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
155	$NH_4I.3NH_3$	196 064		− 8		
156	$NH_4I.4NH_3$	213 095		− 5 1		
157	$3N_2H_4.2HI$	352 020		90		
158	$NH_4I\ 6NH_3$	247 157		28		
159	NH_4IO_3	192 971	R.	d. 150	$3\ 309_4^{21}$	
160	NH_4IO_4	208 971	Tet	exp.	$3\ 056_4^{18}$	
161	$2NH_4IO_3.H_2O$	403 957	Tri.	exp. 150		
162	$3NH_2OH.HI$	227 033		104		
163	N_2S_5	188 341		11	$l\ 1\ 901_4^{18}$	
164	N_4S_4	184 292	R.	178	$2\ 22^{18}$	
165	$N_2O_3.2SO_3$	236 146		230	2 14	
166	NH_4SH	51 1115				
167	$(NH_4)_2S$	68 1426		d.		
168	NO_2SO_3H	127 081	R.	73 d.		
169	NH_2SO_3H	97 0961	R.	205 d.	$2\ 03_4^{12}$	
170	NH_4HSO_4	115 112		146 9	1 78	
171	$SO_2(NH_2)_2$	96 112	R	92		
172	$NH_2SO_3NH_4$	114 127		125		
173	$N_2H_4.H_2SO_4$	130 127	R.	254	1 37	
174	$(NH_4)_2SO_4$ −Mascagnite	132 143	R.	513 d.	1 769	602
175	$(NH_2OH)_2\ H_2SO_4$	164 143	M.	170		
176	$(NH_4)_2S_2O_3$	148 208	M.	d. 150		
177	$(NH_4)_2S_2O_5$	180 208	R.	d.		
178	$(NH_4)_2S_2O_6$	196 208	M.	d. 130		
179	$(NH_4)_2S_2O_8$	228 208	M.	d. 120	1 982	543
181	$NH(SO_2NH_4)_2$	179 223				
182	$NH(SO_3NH_4)_2$	211 223	M.	357	1 965	
183	$(N_2H_4)_2\ H_2SO_4$	162 174		117		
184	NH_4SO_3F	117 104		245		
185	NSe	93 2080		exp. 200		
186	$SeO_2(NO_2)_2$	203 216		− 13		
187	NH_4HSeO_4	162 247	R.	d.	2 162	
188	$(NH_4)_2SeO_4$	179 278	M.	d.	2 194	686
189	$(NH_4)_2SeBr_6$	594 774	C.		3 326	
190	$(NH_4)_2TeO_4$	227 578			$3\ 01^{25}$	
191	P_2O_3	110 048	M.	22 5	$2\ 135_4^{21}$	
192	P_2O_4	126 048	R.?	> 100	$2\ 537_4^{22\ 6}$	
193	P_2O_5	142 048		563 var.	2 387	
194	P_4O	140 096			$1\ 912_4^{26}$	
195	PH_3	34 0471		−132 5	$l.\ 0\ 746^{90}$	4
196	P_2H	63 0557			$1\ 83^{19}$	
197	P_2H_4	66 0788			l. 1 012	
198	P_9H_2	281 231			$1\ 95^{16}$	
199	$P_{12}H_6$	378 334			$1\ 83^{19}$	
200	H_2PO_3	81 0394		35		
201	H_3PO_2	66 0471			$1\ 493^{18\ 8}$	
202	H_3PO_3	82 0471		73 6	$1\ 651^{21\ 2}$	
203	H_3PO_4	98 0471		42 35	$1\ 834^{18\ 2}$	
204	PF_3	88 0240		−160		
205	PF_5	126 024		− 83		
206	POF_3	104 024		− 68		
207	PCl_3	137 398		−111 8	$l\ 1\ 574_4^{20\ 8}$	47
208	PCl_5	208 314	Tet.	148 P.		
209	P_2Cl_4	203 880		− 28		
210	$POCl_3$	153 398		1 25	l. 1 675	25
211	$P_2O_3Cl_4$	251 880		< − 50	$l.\ 1.58^7$	
212	PH_4Cl	70 5128		$28^{46\ atm}$		
213	PF_3Cl_2	158 940				
214	PBr_3	270 772		− 40	$l.\ 2\ 852_4^{15}$	62
215	PBr_5	430 604	R.			
216	$POBr_3$	286 772		56	2 822	
217	PH_4Br	114 971				
218	$POCl_2Br$	197 856		13	l. 2 104	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
219	$POClBr_2$	242.314		30	l. 2.45^{60}	
220	PI_3	411.820	H.	61		
221	P_2I_4	569.776	Tri.	110		
222	PH_4I	161.987				
223	P_2S_3	158.243		290		
224	P_2S_5	222.373		276	2.03	
225	P_3S_6	285.462		298		
226	P_4S_3	220.291		172.5	2.03^{17}	
227	P_4S_7	348.551		310	2.19^{17}	
228	P_4S_{10}	444.746		290		
229	$P_2O_2S_3$	190.243		300		
230	$P_4O_6S_4$	348.356		102		
231	PSF_3	120.089		$3.8^{7.6 at.}$		
232	$PSCl_3$	169.463		− 35	l. 1.635	193
233	PS_2Cl_5	272.444		< − 17		
234	$PSBr_3$	302.837		38	2.85^{17}	
235	P_2SBr_6	573.609		− 5		
236	$P_2S_3Br_4$	477.907			l. 2.262^{17}	
237	$PSCl_2Br$	213.921		− 30	l. 2.12^{0}	
238	$PSClBr_2$	258.379		− 60	l. 2.48^{0}	
239	P_2SI_2	347.977		75		
240	P_3N_5	163.112			2.51^{18}	
241	$NH_4H_2PO_2$	83.0782		100		
242	$NH_4H_2PO_3$	99.0782		*ca.* 123		
243	$NH_4H_2PO_4$	115.078	Tet.		1.803	250
244	$N_2H_4.H_3PO_3$	114.094		36		
245	$N_2H_4.H_3PO_4$	130.094		82		
246	$(NH_4)_2HPO_4$	118.091			1.619	
247	$(N_2H_4)H_4P_2O_6$	194.126		152		
248	$(NH_4)_2H_2P_2O_6$	196.141		170		
249	$N_2H_4(H_2PO_3)_2$	196.141		82		
250	$P_3N_3Cl_6$	347.844	R.	114	1.98	
251	$P_4N_4Cl_8$	463.792		123.5	2.18_{24}^{24}	
252	$P_5N_5Cl_{10}$	579.740		41		
253	$P_6N_6Cl_{12}$	695.688		91		
254	$P_6N_7Cl_9$	603.322		237.5		
255	$P_7N_7Cl_{14}$	811.636		< − 18		
256	$PNBr_2$	204.864	R.	190		
257	PS_3NH_4	145.258			l. $1.78^{16.5}$	
258	As_2O_3	197.920		275	3.71	
259	As_2O_3—Arsenite	197.920	C.		3.865_4^{25}	
260	As_2O_3—Arsenolite	197.920	C.		3.86	160
261	As_2O_3—Claudetite	197.920	M.	315	4.15	986
262	As_2O_5	229.920			4.086	
263	AsH_3	77.9831		−113.5		
264	AsF_3	131.960			l. 2.666_4^0	
265	AsF_5	169.960		− 80		
266	$AsCl_3$	181.334		− 18	l. 2.163	191
267	$AsCl_5$	252.250		*ca.* − 40		
268	$AsBr_3$	314.708		32.8	l. 3.540_4^{25}	
269	AsI_3	455.756		146	4.39_4^{15}	
270	AsI_5	709.620		76	3.93	
271	As_2S_2—Realgar	214.050	M.	307 (β) Tr. 267	α 3.506^19 β 3.254^19	1067
272	As_2S_3—Orpiment	246.115	M.	300 Tr. 170	3.43	1071
273	As_4S_3	396.035			3.60^{19}	
274	$2AsSCl.As_2S_3$	531.081		120		
275	$2AsI_3.SI_6$	1705.17		72		
276	$NH_4H_2AsO_4$	159.014	Tet.		$2.311^{9.1}$	283
277	$(NH_4)_2HAsO_4$	176.045	M.		1.989	
278	SbO_2—Cervantite	153.770	C.		4.07	174
279	Sb_2O_3—Valentinite	291.540	R.	656	5.67	1024

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
280	Sb_2O_3—Senarmontite	291 540	C.		5 2	178
281	Sb_2O_5	323 540			3 78	
282	SbH_3	124 793		− 88	l 2 26^{-25}	
283	SbF_3	178 770	R. ?	292	4 379^{20}	
284	SbF_5	216 770		7	l. 2.990^{23}	
285	$SbF_5.2SbF_3$	574 310		390	4 188^{21}	
286	$SbCl_3$	228 144		73 4	3 140_4^{26}	
287	$SbCl_5$	299 000		2 8	l 2 336	58
288	SbOCl	173 228		170 d.		
289	$Sb_4O_5Cl_2$	637 996	M.		5 014	
290	SbF_2Cl_3	266 144		55		
291	$SbBr_3$	361 518		96 6	4 148^{23} l. 3 845_4^{20}	
292	SbI_3	502 566	Trig. M. R.	167 Tr 114 (R. to Trig.) Tr. 125 (M. to Trig)	M. 4 768^{22} Trig. 4 848^{16}	
293	SbI_5	756 430		79		
294	SbF_5I	343 702		*ca.* 80		
295	$(SbF_5)_2I$	560 472		*ca.* 115		
296	Sb_2S_3—Stibnite	339 735	R.	550	4 64 red 4 120^0 gray 4 284^0 black 4 652^0	1032
297	$Sb_2(SO_4)_3$	531 735			3 625_4^{4}	
298	$Sb_2O_3.2Sb_2S_3$—Kermesite	971 010	M.		4 6	1073
299	SbF_3S	248 835		230		
300	SbSe	200 970		542		
301	Sb_2Se_3	481 140		611		
302	SbS_3e_4	682 110		605		
303	Sb_4Se_5	883 080		590		
304	Sb_2Te_3	626 040		629		
305	BiO	225 000			7 5	
306	BiO_2	241 000			5 6	
306 1	$BiO_2.2H_2O$	277 031		d 110	5 6	
307	Bi_2O_3 (I)	466 000	R.	820	8 9	
308	Bi_2O_3 (II)	466 000		Tr. 704	8 20	
309	Bi_2O_3 (III)	466 000	R.	860	8 5	
310	$Bi_2O_3.3H_2O$—Bismite	520 046	R.	d. 415	4 36	393
311	Bi_2O_5	498 000			5 10	
312	$HBiO_3$	258 008		d. 120	5.75	
313	BiF_3	266 000			5 32	
314	BiOF	244 000			7 5	
315	BiCl	244 458		320		
316	$BiCl_3$	315 374		230	4 7	
317	$BiCl_4$	350 832		225		
318	BiOCl	260 458			7 72	
319	BiBr	288 916		287		
320	$BiBr_3$	448 748		218	5 7	
321	BiOBr	304 916			8 08	
322	BiI_3	589 796	H.	439	5 7	
323	BiOI	351 932	R.		7.92	
324	BiS	241 065		685	7.7	
325	Bi_2S_3—Bismuthinite	514 195	R.		7 39	
326	BiSe	288 200		625		
327	Bi_2Se_3—Guanajuatite	655 600	R.	710	6 82	
328	Bi_2Te_3	800 500		573	7 7	
329	$Bi_2TeO_6.2H_2O$—Montanite	677 531			3 79	1002
330	Bi_2Te_2S—Tetradymite	705 065	R.		7.5	
331	$Bi(NO_3)_3.5H_2O$	485 101	Tri.	d. 30	2.83	
332	$Bi(NO_3)_3.6H_2O$	503 116			2 76	
333	$BiPO_4$	304 024	M.		3.23	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
334	$BiAsO_4$	347.960	M.		7.14	
335	$Bi_3AsH_2O_8$—Atelestite	831.975	M.		6.4	1009
336	$5Bi_2O_3.2As_2O_5.9H_2O$?—Rhagite	2887.98			6.82	
337	CO	28.0000		−207	l. 0.8138_4^{-195}	
338	CO_2	44.0000		$-56.6^{5.2\,at}$	1.53^{-79} l. 1.101^{-37}	
339	C_3O_2	68.0000		−107	1.114^{0}	23
	Compounds of C with elements of key numbers 2 to 15 in ℭ-Table, p. 176					
340	SiO_2—Cristobalite	60.0600	C. Tet. ?	1710	2.32	228
341	SiO_2—Lechatelierite	60.0600			2.20	24
342	SiO_2—Quartz	60.0600	Trig.	<1470 m.	2.651	267
343	SiO_2—Tridymite	60.0600	R.	1670	2.26	463
344	$SiO_2.H_2O$—Opal	60.0600			2.1 to 2.3	69, 82
345	SiH_4	32.0908		−185	l. 0.68^{-185}	
346	Si_2H_6	62.1662		−132.5	l. 0.69^{-25}	
347	Si_3H_8	92.2416		−117	l. 0.725^{0}	
348	Si_4H_{10}	122.317		−93.5	l. 0.79^{0}	
349	Si_2H_6O	78.1662		−144	l. 0.881^{-80}	
350	SiF_4	104.060		−77		
351	$SiHF_3$	86.0677		*ca.* −110		
352	$SiCl_4$	169.892		−70	l. 1.483	192
353	Si_2Cl_6	268.868		−1	l. 1.58^{0}	
354	Si_3Cl_8	367.844		−67		
357	Si_4Cl_{10}	466.820				
358	Si_5Cl_{12}	565.796				
359	Si_6Cl_{14}	664.772		170 s. d.		
360	Si_2OCl_6	284.868		−33		
361	$Si_4O_4Cl_8$	459.904				
362	$Si_4O_3Cl_{10}$	514.820				
363	$Si_8O_{10}Cl_{12}$	809.976				
364	SiH_3Cl	66.5411		−118	l. 1.145_4^{-113}	
365	SiH_2Cl_2	100.991		−122	l. 1.42_4^{-122}	
366	$SiHCl_3$	135.442		−134	l. 1.34	
367	$SiBr_4$	347.724		5	2.812_4^{0}	190
368	Si_2Br_6	535.616		95		
369	Si_3Br_8	723.508		133		
370	Si_4Br_{10}	911.400		185 d.		
371	SiH_3Br	110.999		−94	l. 1.533^{0}	
372	SiH_2Br_2	189.907		−77	l. 2.17^{0}	
373	$SiHBr_3$	268.816		<−60	l. 2.7^{17}	
374	Si_2H_5Br	141.075		−100		
375	Si_2HBr_5	456.708		89		
376	$SiCl_3Br$	214.350		<−60		
377	$SiCl_2Br_2$	258.808		<−60		
378	$SiClBr_3$	303.266		−39	l. 2.432	
379	SiI_4	535.788		120.5		
380	Si_2I_6	817.712		250		
381	$SiHI_3$	409.864		8	l. 3.314	
382	$SiCl_3I$	261.366		<−60		
383	$SiCl_2I_2$	352.840		<−60		
384	$SiClI_3$	444.314		2		
385	$SiBr_3I$	394.740		14		
386	$SiBr_2I_2$	441.756		38		
387	$SiBrI_3$	488.772		*ca.* 53		
388	SiS	60.1250			1.853_4^{15}	
389	$SiSCl_2$	131.041		75		
390	$SiCl_3.SH$	167.507				
391	$SiSBr_2$	219.957		93		
392	SiN	42.0680			3.17	
393	Si_2N_3	98.1440			3.64	
394	Si_3N_4	140.212			3.44	
395	Si_2N_3H	99.1517			2.015^{17}	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
396	Si_3H_9N	107.257			l. 0.895^{-104}	
397	$N_2H_4.H_2SiF_6$	176.122		186 d.		
398	$(NH_4)_2SiF_6$—Cryptohalite	178.138	C.		2.01	68
399	$SiBr_4.6NH_3$	449.911			2.307^{17}	
400	$SiO_2.P_2O_5$	202.108			3.1	
401	$3SiO_2.2Bi_2O_3$—Agricolite	1112.18	M.		6	994
402	$3SiO_2.2Bi_2O_3$—Eulytite	1112.18	C.		6.11	175
403	SiC—Carborundum	40.0600	H.	>2700	3.17	110
404	$Si(CH_3)H_3$	46.1062		−156.4	l. 0.62_4^{-57}	
405	$Si(CH_3)_2H_2$	60.1216		−149.9	l. 0.68_4^{-80}	
406	$Si(CH_3)_4$	88.1524			l. $0.645_4^{21.9}$	
407	$Si(CH_3)_3C_2H_5$	102.168			l. 0.684	
408	$Si(C_2H_5)_3H$	116.183			l. 0.751^0	
409	$Si(CH_3)_2[(C_2H_5)_2]$	116.183			l. 0.7168	
410	$Si(CH_3)_3C_3H_7$	116.183			l. 0.701_4^{21}	
411	$Si(CH_3)_2[(CH_2)_5]$	128.183			l. 0.804	439
412	$Si(CH_3)_2(C_2H_5)(C_3H_7)$	130.199			l. $0.732_4^{17.6}$	
413	$Si(CH_3)_3(C_4H_9)$	130.199			l. 0.721_4^{17}	
414	$Si(CH_3)_3(iso\text{-}C_4H_9)$	130.199			l. 0.717_4^{18}	
415	$Si(CH_3)_2(C_3H_7)_2$	144.214			l. $0.741_4^{17.6}$	
416	$Si(CH_3)_2(C_2H_5)(iso\text{-}C_4H_9)$	144.214			l. 0.743	
417	$Si(CH_3)_3(iso\text{-}C_5H_{11})$	144.214			l. 0.731_4^{16}	
418	$Si(C_2H_5)_4$	144.214			l. $0.766_4^{19.6}$	1036
419	$Si(C_3H_7)_3H$	158.229			l. 0.762_4^{16}	
420	$Si(C_2H_5)_3(C_3H_7)$	158.229			l. 0.774_4^{17}	
421	$Si(C_2H_5)_3(C_4H_9)$	172.245			l. 0.779_4^{18}	
422	$Si(C_2H_5)_3(iso\text{-}C_4H_9)$	172.245			l. $0.781_4^{18.6}$	
423	$Si(C_2H_5)_3(iso\text{-}C_5H_{11})$	186.260			l. 0.782_4^{19}	
424	$Si(C_6H_5)_4$	336.214		233		
425	$Si_2(CH_3)_6$	146.259			l. $0.725_4^{22.6}$	
426	$Si(OCH_3)_4$	152.152			l. 1.028_4^{22}	9
427	$Si(C_2H_5)_3OH$	132.183			l. 0.871^0	
428	$Si(C_2H_5)_3OC_2H_5$	160.214			l. 0.840^0	
429	$Si(OC_3H_7)_4$	264.276			l. 0.915	1034
430	$Si(C_6H_5)_3OH$	276.183			1.178	
431	$Si(C_6H_5CH_2)_3OH$	318.229		106	1.177	
432	$Si_2O(OC_3H_7)_6$	426.443			l. $0.977_4^{22.5}$	1035
433	$Si(CH_3)H_2Cl$	80.5565		−134.1	l. 0.935_4^{-80}	
434	$Si(CH_3)HCl_2$	115.007		−93	l. 0.93_4^{0}	
435	$Si(C_2H_5)Cl_3$	163.473			l. $1.239_4^{20.4}$	
436	$Si(C_3H_7)Cl_3$	177.488			l. 1.210_4^{10}	1
437	$Si(C_2H_5)_2Cl_2$	157.053			l. 1.106_4^{15}	
438	$Si(C_4H_9)Cl_3$	191.503			l. $1.162_4^{18.8}$	
439	$Si(iso\text{-}C_4H_9)Cl_3$	191.503			l. 1.154	
440	$Si(C_2H_5)(C_4H_9)Cl_2$	185.084			l. 1.042	
441	$Si(C_6H_5)Cl_3$	211.473			l. $1.326_4^{18.8}$	
442	$Si(C_6H_5CH_2)Cl_3$	225.488			l. $1.289_4^{19.8}$	
443	$Si(C_2H_5)(C_6H_5)Cl_2$	205.053			l. 1.159_4^{16}	
444	$Si(SCN)_4$	260.352		143.8		
445	TiO_2—Anatase	79.9000	Tet.		3.84	407
446	TiO_2—Brookite	79.9000	R.		4.17	1028
447	TiO_2—Rutile	79.9000	Tet.	1640 d.	4.26	409
448	Ti_2O_3	143.800	Trig.		4.6	
449	TiF_4	123.900			$2.798^{20.5}$	
450	$TiCl_4$	189.732		−30	l. 1.726	59
451	$TiBr_4$	367.564		39		
452	$TiBrCl_3$	234.190				
453	TiI_2	301.764			4.30	
454	TiI_4	555.628		150		
455	$TiCl_4.SCl_4$	363.629		64		
456	Ti_2N_2	123.816		2930	5.18^{18}	
457	TiP	78.9240			3.95_4^{25}	
458	$TiCl_4.PCl_5$	327.130		85.5		

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
459	$TiCl_4.POCl_3$	343 130		110		
460	$TiCl_4.2POCl_3$	496 528		107		
461	TiC	59 9000		3180	4.25	
462	$Ti_{10}C_2N_8$	615 064			5.29	
463	Ti_2Si	123 860			4 02	
464	GeO_2	104 380	R.		4.703	
465	GeH_4	76 4108		−165	l. 1.523^{-142}	
466	Ge_2H_6	150 806		−109	l. 1.98^{-109}	
467	Ge_3H_8	225 202		−105 6	l. $2\ 20^{-105}$	
468	$GeCl_4$	214 212		− 49 5	l. $1\ 874_{25}^{25}$	
469	$GeHCl_3$	179 762				
470	$GeBr_4$	392 044		26 1	l. $3\ 132_{20}^{20}$	
471	GeI_4	580 108		144	$4\ 322_{26}^{26}$	
472	$Ge(C_2H_5)_4$	188 534		− 90	$0\ 991_{24\ 5}^{24\ 5}$	13

All Zr salts probably contaminated with 1–5% Hf

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
473	ZrO_2 Baddeleyite	123 000	M.	2700	5 49	1012
473 1	ZrO_2 (free from Hf)	123 000			5.73	
474	ZrF_4	167 000			4 43	
475	$ZrCl_4$	232 832				
475 5	$ZrOCl_2.8H_2O$	322 039				274.5
476	$ZrOS$	139 065			4 87	
477	$4ZrO_2.3SO_3$	732 195			4 1	
478	$4ZrO_2.3SO_3.15H_2O$	1002 43	M.		2 5	
478 5	$(NH_4)_3ZrF_7$	278 034	C.			70 2
479	ZrP_2	153 048			$4\ 77_4^{25}$	
480	$2ZrCl_4.PCl_5$	673 978		164 5		
481	ZrC_2	115 000				
482	$ZrSi_2$	147 120			$4\ 88^{22}$	
483	$ZrO_2.SiO_2$ Zircon	183 060	Tet.	2500	4 5	382, 387
484	SnO	134 700	C.		6 95	
485	SnO_2 Cassiterite	150 700	Tet. H. R.		7 0	391
486	SnF_4	194 700			4 78	
487	$SnCl_2$	189 616		246 8		
488	$SnCl_4$	260 532		− 30 2	l. 2 226	
489	$H_2SnCl_6.6H_2O$	441 556			$1\ 925^{27}$	
490	$SnBr_2$	278 532		215 5	$5\ 12^{17}$	
491	$SnBr_4$	438 364		31 0	l $3\ 34^{35}$	
492	$SnCl_3Br$	304 990		− 31	l. $2\ 5^{13}$	
493	$SnCl_2Br_2$	349 448		− 20	l. $2\ 8^{13}$	
494	$SnClBr_3$	393 906		1	l. $3\ 1^{13}$	
495	SnI_2	372 564		320		
496	SnI_4	626 428		143 5	4 46	
497	$SnCl_2I_2$	443 480			l 3 29	
498	$SnBr_2I_2$	532 396		50 d.	3 6	
499	SnS	150 765		880	$5\ 080^0$	
500	SnS_2	182 830			4 5	
501	$SnSe$	197 900		861	$6\ 18^0$	
502	$SnSe_2$	277 100			5 0	
503	$SnTe$	246 200		780	6 48	
504	$SnCl_4.2NOCl$	391 464		180	2 6	
505	$2NH_4Cl.SnCl_4$	367 526			2 4	
506	$(NH_4)_2SnBr_6$	634 274			3.50	
507	Sn_4P_3	567 872			5 18	
508	$SnCl_4.POCl_3$	413 930		58		
509	Sn_3As_2	462 280			6 56	
510	SnC_2O_4	206 700			3.56^{18}	
512	$Sn(C_2H_5)_2$	176 777			l. 1 654	
513	$Sn(CH_3)_4$	178 792			l. $1\ 314^0$	50
514	$Sn(CH_3)_2(C_2H_5)_2$	206 823			l. 1 232	
515	$Sn(C_2H_5)_4$	234 854			l. $1\ 187^{23}$	44
516	$Sn(C_6H_5)_2$	272 777		225 7		

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
517	$Sn(C_6H_5)_4$	426 854		226		
518	$Sn_2(C_2H_5)_6$	411 631			1. 1 412^{0}	
519	$Sn(C_2H_3O_2)_2$	236 746		182		
520	$SnCl(C_2H_5)_3$	241 274			1. 1 428^{0}	
521	$SnBr(C_2H_5)_3$	285 732			1. 1 630	
522	$SnI(CH_3)_3$	290 701			1. 2 100^{18}	
523	$SnI(C_2H_5)_3$	332 748			1. 1 833^{22}	
524	PbO—Litharge	223 200	Tet.	888	9 53	423
525	PbO—Massicotite	223 200	R.		8 0	1068
526	PbO_2—Plattnerite	239 200	Tet.		9 375	417
527	Pb_3O_4—Minium	685 600			9.1	
528	PbF_2	245 200		855	8 24	
529	$PbCl_2$—Cotunnite	278 116	R.	501	5 85	1016
530	$PbCl_4$	349 032		− 15	1. 3 18$^{0}_{4}$	
531	$Pb(ClO_2)_2$	342 116		exp. 126		
532	$Pb(ClO_3)_2$	374 116			3 89	
533	$Pb(ClO_3)_2.H_2O$	392 131	M.	d. 110		
534	$Pb(ClO_4)_2.3H_2O$	460 162	R.	d. 100	2 6	
535	$PbO.PbCl_2$—Matlockite	501 316	Tet.	524 d.	7 21	1008
536	$2PbO.PbCl_2$—Mendipite	724 516	R.	693	7 08	1022
537	$PbO.2PbCl_2$—Penfieldite	779 432	H			398
538	$6PbO.PbCl_2$—Lorettoite.	1617 32	Tet.		7 6	418
539	$PbCl_2.PbO.H_2O$—Laurionite	519 331	R	d. 142	6 24	1006
540	$PbCl_2.PbO.H_2O$—Paralaurionite	519 331	M	d. 150	6.05	
541	$2PbCl_2.PbO.H_2O$—Fiedlerite	797 447	M	d. 150	5 88	1005
542	PbFCl	261 658	Tet.	601		
543	$PbBr_2$	367 032	R.	373	6 66	
544	$Pb(BrO_3)_2 H_2O$	481 047	M.	d. 180	5.53	
545	$PbO.PbBr_2.H_2O$	608 248	R.		6.72	
546	PbClBr.	322 574			5 74	
547	PbI	334 132		d. 300		
548	PbI_2	461 064	H.	402	6 16	
549	$Pb(IO_3)_2$	557 064		d. 300		
550	$PbO.PbI_2$	684 264		300 d.		
551	$PbI_2.PbO.H_2O$	702 280	R.	d. < 100	6 83	
552	PbS—Galena	239 265	C.	1114	7 5	189
553	$PbSO_4$—Anglesite	303 265	R. M.	1170 Tr. 864	6 2	981
554	PbS_2O_3	319 330			5 18	
556	$PbS_2O_6.4H_2O$	439 392			3 22	311
557	$Pb_2O(SO_4)$—Lanarkite	526 465	M	977	6 92	995
558	PbSe—Clausthalite	286 400	C.	1065	8 10	
559	$PbSeO_4$	350 400	R	d.	6 37	
560	PbTe—Attaite	334 700	C.	917	8 16	
561	PbN_6	291 248		exp. 350		
562	$Pb(NO_3)_2$	331 216	C M.	470	4 53	162
563	$2PbO.N_2O_5.1.5H_2O$	581 439	M.	d. 100		
564	$4PbO.N_2O_3.N_2O_5 2H_2O$	1112 86	R.	d. 100		
565	$2PbO.N_2O_5.H_2O$	572 431	R	d. 180	5 93	
566	$(NH_4)_2PbCl_6$	456 026	C	d. 120		
567	$Pb(PO_3)_2$.	365 248		800		
568	$Pb_2P_2O_7$	588 448	R.	824	5.8	
569	$3PbO.P_2O_5$	811 648		1014 Tr. 782		389
570	$4PbO.P_2O_5$	1034 85		982		
571	$5PbO.2P_2O_5$	1400 10		946		
572	$8PbO P_2O_5$	1927 65		860		
573	$PbCl_2.3Pb_3(PO_4)_2$—Pyromorphite	2713 06	H.	1156	6 8	1000
574	$Pb(AsO_2)_2$	421 120			5 85	
575	$Pb(AsO_3)_2$	453 120	H.		6 42	
576	$Pb_2As_2O_7$	676 320		802	6 85	998
577	$Pb_3(AsO_4)_2$	899 520		1042	7 30	
578	$Pb_3(AsO_4)_2.0.5H_2O$	908 528			7.00	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
579	$5PbO.Pb_3(AsO_4)_2$	2015.52		862		
580	$5PbO.Pb_3(AsO_4)_2.0.5H_2O$	2024.53	R.		8.04	
581	$10PbO.3As_2O_5.3H_2O$	2975.81	H.		6.86	179
582	$PbHAsO_4$	347.168	M.	d. >200	5.79	1054
583	$Pb(H_2AsO_4)_2$	489.151	Tri.	d. 140	4.46	963
584	$Pb_4(PbOH)_2(AsO_4)_4$	2040.26			7.08	
585	$2Pb_3(AsO_4)_2.2Pb(OH)_2.10H_2O$	2461.62			7.1	
586	$65PbO.21As_2O_5.12H_2O$	19552.5		d. >200	7.10	
587	$9PbO.3As_2O_5.PbCl_2$—Mimetite	2976.68	H.	1140 Tr. 395	7.13	399
588	$4PbO.As_2O_3.2PbCl_2$—Ecdemite	1646.15	R.		7.0	
589	$3PbCl_2.3PbO.As_2O_5$—Georgiadesite	1733.87	R.	d.	7.1	
590	$5PbO.2PbCl_2.As_2O_3$	1870.15	Tet.		7.14	
591	$PbS.As_2S_3$—Sartorite	485.380	R.	<700 d.	4.6	
592	$2PbS.As_2S_3$—Dufrenoysite	724.645	R.		5.50	
593	$3PbS.2As_2S_3$—Rathite	1210.03	R.		5.41	
594	$4PbS.As_2S_3$—Jordanite	1203.18	M.		6.10	
595	$4PbS.3As_2S_3$—Baumhauerite	1695.41	M.		5.33	
596	$7PbS.2As_2S_3$—Lengenbachite	2167.09	Tri.		5.8	
597	$10PbS.3As_2S_3$—Guitermanite	3131.00			5.94	
598	$3PbO.Sb_2O_5$—Monimolite	1236.68	C.		6.58	
599	$PbO.PbCl_2.Sb_2O_3$—Nadorite	792.856	R.		7.02	1059
600	$PbS.Sb_2S_3$—Zinkenite	579.000	R.		5.3	
601	$2PbS.Sb_2S_3$—Plumosite	818.265	M.		5.62	
602	$3PbS.Sb_2S_3$—Dürfeldtite	1057.53			5.9	
603	$3PbS.2Sb_2S_3$—Domingite	1397.27			5.62	
604	$4PbS.Sb_2S_3$—Meneghinite	1296.80	R.		6.30	
605	$5PbS.Sb_2S_3$—Geocronite..	1536.06	R.		6.4	
606	$5PbS.2Sb_2S_3$—Boulangerite	1875.80	R.		6.18	
607	$5PbS.2Sb_2S_3$—Mullanite	1875.80	R.		6.3	
608	$5PbS.4Sb_2S_3$—Plagionite	2555.27	M.		5.47	
609	$6PbS.Sb_2S_3$—Kilbrickenite	1775.33			6.5	
610	$PbS.Bi_2S_3$—Galenobismutite	753.460			6.9	
611	$2PbS.Bi_2S_3$—Cosalite, Bjelkite	992.725	R.		6.6	
612	$2PbS.3Bi_2S_3$—Chiviatite	2021.12			6.92	
613	$3PbS.Bi_2S_3$—Lillianite	1231.99	R.		7.0	
614	$4PbS.5Bi_2S_3$—Rezbanyite	3528.04			6.2	
615	$6PbS.Bi_2S_3$—Beegerite	1949.79	C.		7.27	
616	$2BiSCl.PbS.Bi_2S_3$	1306.51		500 d.	6.42	
617	$PbCO_3$—Cerussite	267.200	R.	d. 315	6.6	1001
618	PbC_2O_4	295.200			5.28	
619	$Pb(CH_3)_4$	267.292		−27.5	l. 1.995	42
621	$Pb(CH_3)_3(C_2H_5)$	281.308			l. 1.889	43
622	$Pb(CH_3)_2(C_2H_5)_2$	295.323			l. 1.790	48
623	$Pb(CH_3)_3(C_3H_7)$	295.323			l. 1.760_4^{22}	37
624	$Pb(C_2H_5)_3(CH_3)$	309.339			l. 1.712_4^{22}	46
625	$Pb(CH_3)_3(C_4H_9)$	309.339			l. 1.674_4^{24}	34
626	$Pb(CH_3)_3(iso\text{-}C_4H_9)$	309.339			l. $1.668_4^{22.5}$	32
627	$Pb(CH_3)_2(C_3H_7)_2$	323.354			l. $1.623_4^{24.4}$	35
628	$Pb(C_2H_5)_4$	323.354			l. 1.659_4^{18}	51
629	$Pb(CH_3)_3(iso\text{-}C_5H_{11})$	323.354			l. $1.524_4^{21.4}$	30
630	$Pb(C_2H_5)_3(C_3H_7)$	337.369			l. $1.595_4^{22.5}$	49
631	$Pb(C_2H_5)_2(C_3H_7)_2$	351.385			l. $1.529_4^{25.4}$	41
632	$Pb(CH_3)_2(iso\text{-}C_4H_9)_2$	351.385			l. $1.504_4^{20.6}$	33
633	$Pb(C_2H_5)_3(iso\text{-}C_4H_9)$	351.385			l. $1.530_4^{22.6}$	40
634	$Pb(CH_3)_2(iso\text{-}C_5H_{11})_2$	379.416			l. 1.430	31
635	$Pb(C_2H_5)_2(iso\text{-}C_4H_9)_2$	379.416			l. 1.456_4^{22}	36
636	$Pb(C_2H_5)_3(C_5H_{11})$	365.400			l. 1.482	38
637	$Pb(C_2H_5)_3(iso\text{-}C_5H_{11})$	365.400			l. $1.506_4^{21.8}$	39
638	$Pb(C_6H_5)_4$	515.354		227.7		
639	$Pb(CHO_2)_2$	297.215	R.	d. 190	4.63	973
640	$Pb(dl\text{-}C_4H_4O_6)$	355.231			2.530^{19}	
641	$Pb(d\text{-}C_4H_4O_6)$	355.231	R.		3.871^{19}	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
642	$Pb(C_2H_3O_2)_2$	325 246		280	3 251	
643	$Pb(C_2H_3O_2)_2.3H_2O$	379 292	M.	75	2 55	710
644	$Pb(C_2H_3O_2)_2.10H_2O$	505 400	R.	22	1 689	
645	$Pb(C_2H_3O_2)_4$	459 292		180	$2\ 23_4^{18}$	
646	$Pb(C_3H_5O_2)_4$	515 354		132		
647	$Pb(C_6H_{11}O_2)_2$	437 369		74		
648	$Pb(C_7H_{13}O_2)_2$	465 400		91 5		
649	$Pb(C_8H_{15}O_2)_2$	493 431		84 5		
650	$Pb(C_9H_{17}O_2)_2$	521 416		95		
651	$Pb(C_{10}H_{19}O_2)_2$	549 493		100		
652	$Pb(C_{12}H_{23}O_2)_2$	605 554		104		
653	$Pb(C_{14}H_{27}O_2)_2$	661 616		107		
654	$Pb(C_{16}H_{31}O_2)_2$	717 677		112		
655	$Pb(C_{18}H_{33}O_2)_2$	769 708		ca 80		
656	$Pb(C_{18}H_{35}O_2)_2$	773 739		125		
657	$3PbO.2CO_2.H_2O$—Hydrocerusite	775 615	H.	d. 400	6 14	395
658	$PbCl_2.PbCO_3$—Phosgenite	545 316	Tet		6 13	396
659	$PbBr_2.PbCO_3$	634 232	Tet.	d.	6 55	
660	$Pb(OH)_2.PbSO_4.2PbCO_3$—Leadhillite	1078 88	M.		6 5	996
661	$Pb(OH)_2.PbSO_4.2PbCO_3$—Maxite	1078 88	R.		6 9	
662	$Pb(SCN)_2$	323 346	M.		3 82	
663	$PbSiO_3$—Alamosite	283 260	M.	766	6 49	992
664	$2PbO.SiO_2$	506 460		746		
665	$3PbO.SiO_2$?	729.660		717		
666	$3PbO.2SiO_2$—Barysilite	789 720	Trig.		6 72	394
667	$SnPbS_2$—Teallite	390 030	R		6 4	
668	ThO_2—Thorianite	264 150	C.	>2800	9 69	182
669	$ThCl_4$	373 982	R	820	4 59	
670	$ThBr_4$	551 814			5 67	
671	ThS_2	296 280		d.	6 8	
672	$ThOS$	280 215		d.	6 14	
673	$Th(SO_4)_2.9H_2O$	602 419	M.	d.	2 77	
674	$Th(PO_3)_4$	548 246	R.		4 08	
675	ThC_2	256 150			8 96	
676	$ThSi_2$	288 270			$7\ 96^{16}$	
677	$ThO_2.SiO_2$—Thorite	324 210	Tet.		5 3	
678	$GaCl_2$	140 636		175		
679	$GaCl_3$	176 094		75 5	$2\ 36_{80}^{80}$	
680	$(NH_4)_2Ga_2(SO_4)_4.24H_2O$	992 147			1 77	89
681	In_2O_3	277 600	Trig.		7 179	
682	$InCl_3$	221 174			4 0	
683	$In(ClO_4)_3.8H_2O$	557 297		80		
684	InI	241 732		351		
685	InI_2	368 664		212		
686	InI_3	495 596		199		
687	$In_2(SO_4)_3$	517 795			3 438	
688	$(NH_4)_2InCl_5.H_2O$	346 183	R.		2 281	
689	$(NH_4)_2InBr_5.H_2O$	568 173	R.		3 167	
690	$(NH_4)_2In(SO_4)_2.12H_2O$	541 154			2 011	88
691	Tl_2O	424 800		300		
692	Tl_2O_3	456 800		759	brown $9\ 65_4^{21}$ black $10\ 19_4^{22}$	
693	$TlOH$	221 408				
694	$Tl(OH)_3$	255 423		>340		
695	TlF	223 400				
696	$TlCl$	239 858		430	7.00	
697	$TlCl_3.4H_2O$	382 836		37		
698	$TlClO_3$	287 858			5 0479	
699	$TlClO_4$	303 858		501	4 89	
700	$TlBr$	284 316		460	$7\ 557_4^{17\ 8}$	
701	$TlBr_3.4H_2O$	516 210		40		
702	$TlBr_2Cl.4H_2O$	471 752		40 d.		
703	TlI	331 332		440	$7.09_4^{14\ 7}$	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
704	Tl_2S	440.865		448	8.0	
705	Tl_2S_5	569.125		125		
706	Tl_2S_7	185.966		127		
707	Tl_2SO_4	504.865	R.	632		975
708	$Tl_2S_2O_6$	568.930	M.		5.57	
709	$TlHSO_4$	301.473		120 d.		
710	Tl_2Se	488.000		340		
711	$Tl_2Se.Tl_2Se_3$	1134.40		338		
712	Tl_2SeO_4	552.000	R.		6.875	991
713	Tl_2Te	536.300		412		
714	Tl_2TeO_4	600.300			5.712	
715	TlN_3	246.424		334		
716	$TlNO_3$	266.408	γ R. β Trig. α C.	206 Tr. 75 (γ to β) Tr. 145 (β to α)	$5.556_4^{21.4}$	1053
717	$(NH_4)_3TlCl_6.2H_2O$	507.295			2.389	
718	Tl_3PO_4	708.224			6.89	
719	$Tl_4P_2O_7$	991.648	M.	>120	6.786	
720	TlH_2PO_2	269.439	M.	190		
721	TlH_2PO_4	301.439	M.	190	4.723	
722	$Tl_2H_2P_2O_7$	584.863		270		
723	$Tl_2S.As_2S_3$ - Lorandite	686.980	M.		5.53	1072
724	$TlSbAs_2S_5$—Vrbaite.	636.415	R.		5.30	
725	Tl_2CO_3	468.800			7.11	
726	$Tl(C_2H_3O_2)$	263.423		110	3.68 1 3 9	
727	$Tl(CHO_2)_3$.	339.423	M.	95		
728	$Tl(C_3H_5O_2)$	277.439		140	2.8	
729	$Tl(d\text{-}C_4H_5O_6)$	353.439	R.		3.496	
730	$Tl(dl\text{-}C_4H_5O_6)$	353.439	Tri.		3.494	
731	$Tl(meso\text{-}C_4H_5O_6).0.5H_2O$	362.446	Tri.		3.518	
732	$TlH(C_2H_3O_2)_2$	323.454		64		
733	$Tl_2(d\text{-}C_4H_4O_6)$	556.831	Trig.		4.80	558
734	$Tl_2(meso\text{-}C_4H_4O_6)$	556.831	Tri.		5.110	899
735	$Tl_2(dl\text{-}C_4H_4O_6)$	556.831	M.	165	4.66	957
736	$Tl_2(d\text{-}C_4H_4O_6).0.5H_2O$	565.838	M.		4.60	
738	$TlH(Cl_3CCO_2)_2$	530.156	Tet.		2.822_4^{18}	
739	$TlH(CBr_3CO_2)_2$	796.904	M.		3.923^{18}	
740	$TlOC_6H_2(NO_2)_3$—Picrate	432.440	M. (red) Tri. (yellow)		3.164_4^{17} 2.993_4^{25}	
741	$Tl(SbO)(d\text{-}C_4H_4O_6).H_2O$	508.216	R.		3.990	
742	$TlCl.2PbCl_2$	796.090	C.	435		
743	$TlGa(SO_4)_2.12H_2O$	682.435			2.477	110
744	ZnO—Zincite.	81.3800	H.	>1800	5.606	392
745	ZnO	81.3800			5.47	
746	$Zn(OH)_2$	99.3954	R.	d. 125	3.053	
747	ZnF_2	103.380	M. Tri. ?	872	4.84_4^{15}	
748	$ZnF_2.4H_2O$	175.442	R.	Tr. 100	2.535_4^{12}	
749	$ZnCl_2$	136.296	C.	365	2.91_4^{25}	
750	$Zn(ClO_3)_2.4H_2O$	304.357			2.15	
751	$Zn(ClO_4)_2.6H_2O$	372.388			2.15	
752	$ZnBr_2$	225.212	R.	394	4.219	
753	ZnI_2	319.244	C.	446	$4.666_4^{14.2}$	
754	$Zn(IO_3)_2$	415.244		d.	4.98	
755	$ZnS(\alpha)$—Würzite	97.4450	H.	1850^{150at}	4.087	404
756	$ZnS(\beta)$—Sphalerite	97.4450	C.	Tr. 1020	4.102_4^{25}	187
757	$ZnSO_4$—Zinkosite	161.445	R.	d. 740	3.74_4^{15}	860
758	$ZnSO_4.H_2O$	179.460		d. 238	3.28_4^{15}	
759	$ZnSO_4.6H_2O$	269.537	M.	Tr. 70.0	2.072_4^{15}	
760	$ZnSO_4.7H_2O$ Goslarite	287.553	R.	Tr. 39.0	1.97	490
761	$ZnS_2O_6.6H_2O$	333.602	Tri.		1.915	
762	$ZnSe$	144.580	H.		5.42_4^{15}	188.1

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
763	$ZnSeO_4.5H_2O$	298 657	Tri.	d. >50	2 591	
764	$ZnSeO_4.6H_2O$	316 672	Tet.	d.	2 325	252
765	$ZnTe$	192 880	C.	1238 $_5$	5 54$_4^{18}$	188.2
766	$Zn(NO_3)_2$	189 396		44 07		
767	$Zn(NO_3)_2.3H_2O$	243 442		45 5		
768	$Zn(NO_3)_2.6H_2O$	297 488	Tet.	36 4	2 065$_4^{14}$	
769	$ZnCl_2.NH_3$	153 377				
770	$ZnCl_2.2NH_3$	170 358	R.	210 8		
771	$ZnCl_2.2NH_4Cl$	243 290	R.		1 82	
772	$Zn(ClO_3)_2.4NH_3$	300 420		exp. 205	1 84	
773	$ZnBr_2.2NH_4Br$	421 122			2 625	
774	$Zn(BrO_3)_2.4NH_3$	389 336		exp. 169	2 27	
775	$Zn(IO_3)_2.4NH_3$	483 368		exp. 215	2 82	
776	$ZnSO_4.(NH_4)_2SO_4$	293 588			2 2$_5$	
777	$ZnSO_4.(NH_4)_2SO_4.6H_2O$	401 680	M.	d.	1 931	516
778	$Zn(SeO_4).(NH_4)_2SO_4.6H_2O$	495 950	M.		2 20	620
779	Zn_3P_2	258 188	C.	>420	4 55$_4^{13}$	
780	$Zn_3(PO_4)_2$	386 188	R.	9$_{00}$	3 998$_4^{15}$	
781	$Zn_3(PO_4)_2.4H_2O$—α Hopeite	458 250	R.	Tr. >105	3 04	734
782	$Zn_3(PO_4)_2.4H_2O$—β Hopeite	458 250	R.	Tr. >140	3 03	720
783	$Zn_3(PO_4)_2.4H_2O$—Parahopeite	458 250	Tri.	Tr. >163		793
784	$ZnH_4(PO_4)_2.2H_2O$	295 490	Tri.	100 d.		
785	$Zn_2(OH)PO_4$—Tarbuttite	242 792	Tri.		4 1$_3$	898
786	$Zn_3(PO_4)_2\ Zn(OH)_2.3H_2O$—Spencerite	539 630	M.	d. 100	3 14	755
787	$Zn_2P_2S_6$	385 198	H.		2 2	
788	$ZnAs_2$	215 300		771		
789	Zn_3As_2	346 060	C.	1015		
790	$Zn_2As_2O_7$	392 680			4 701$_4^{21}$	
791	$Zn_3As_2O_8$	474 060	R.		4 913$_4^{15}$	
792	$Zn_3(AsO_4)_2.8H_2O$—Koettigite	618 183	M.	d. 100	3 309^{15}	881
793	$4ZnO.As_2O_5.H_2O$—Adamite	573 455	R.	d. >100	4 3$_{45}$	918
794	$ZnCO_3$—Smithsonite	125 380	Trig.	d. 3$_{00}$	4 4$_4$	369
795	ZnC_2O_4	153 380			2 58$_4^{17.5}$	
796	$ZnC_2O_4.2H_2O$	189 411		d. 100	2 562	
797	$Zn(CH_3)_2$	95 4262		− 40	l 1 386^{10}	
798	$Zn(C_2H_5)_2$	123 457		− 28	l. 1 182^{18}	
799	$Zn(C_3H_7)_2$	151 488				
800	$Zn(iso\text{-}C_5H_{11})_2$	207 549			l 1 022^{0}	
801	$Zn(CHO_2)_2$	155 395			2 3$_6$	
802	$Zn(CHO_2)_2\ 2H_2O$	191 426	M.		2 205	
803	$Zn(C_2H_3O_2)_2$	183 426		142	1 840	
804	$Zn(C_2H_3O_2)_2.2H_2O$	219 457	M.	237	1 735	518
805	$Zn(l\text{-}C_4H_5O_5)_2.2H_2O$—*l*-Malate	367 488	Tet.		1 701^{20}	
806	$Zn(C_3H_7CO_2)_2$	239 488	M.			535
807	$5ZnO\ 2CO_2.3H_2O$—Hydrozincite	548 947	M ?		3 7	920
808	$Zn(CH_2SO_3)_2.3H_2O$—Ethane disulfonate	307 587	Tri.		2 043	
809	$ZnC_{10}H_6O_6S_2.6H_2O$—1, 5-Naphthalene disulfonate	459 649	M.		1 793	791
810	$Zn(CN)_2$	117 396	R.	d. 8$_{00}$		
811	$ZnO.SiO_2$	141 440		1437	3 52	
					l 3 86 gls	
812	$2ZnO.SiO_2$—Willemite	222 820	Trig.	1509	3 $_9$	341
813	$2ZnO.SiO_2.H_2O$—Calamine	240 835	R.		3 45	780
814	$ZnSiF_6.6H_2O$	315 532	H.		2 104	209
815	$ZnSiS$	125 505			3 41	
816	$ZnO.TiO_2$	161 280			3 17	
817	$ZnO.3TiO_2$	321 080			4 92$_4^{15}$	
818	$3ZnO\ 2TiO_2$	403 940			3 83	
819	$4ZnO.5TiO_2$	725 020			3.68$_4^{19}$	
820	$Tl_2Zn(SO_4)_2.6H_2O$	774 402	M.	d. 120	3 7$_{20}$	771
821	CdO	128 410	C.		8 1$_5$	
822	Cd_2O	240 820		d.	8 192$_4^{18}$	
823	$Cd(OH)_2$	146 425	Trig.	d. 300	4 79$_4^{15}$	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
824	CdF_2	150 410	C.	1100	6.64	
825	$CdCl_2$	183 326	C.	568	$4\ 047_4^{25}$	
826	$CdCl_2.2.5H_2O$	228 364	M.	Tr. 34	3 327	829
827	$Cd(ClO_3)_2.2H_2O$	315 357		80		
828	$CdCl_2.CdO.H_2O$	329 751	H.	d. 280	$4\ 56_4^{15}$	
829	$CdBr_2$	272 242		583	5.192_4^{25}	
830	$Cd(BrO_3)_2.2H_2O$	404 273	R.		3.758	
831	$CdO.CdBr_2.H_2O$	418 667			4.87_4^{15}	
832	$CdI_2(\alpha)$	366 274	H.	388	$5\ 670_4^{20}$	
832 1	$CdI_2(\beta)$	366 274			$5\ 305_4^{20}$	
833	$Cd(IO_3)_2$	462 274			6 48	
834	$Cd(IO_3)_2.H_2O$	480 289		Tr. 160	6 43	
835	CdS—Greenockite	144 475	H.	$1750^{100\ at}$	4 820	406
836	$CdSO_4$	208 475	R.	1000	$4\ 691_4^{24}$	
837	$CdSO_4.H_2O$	226 490	M.	Tr. 108	3 786	
838	$CdSO_4.2.66H_2O$	256 583	M.	Tr. 41 5	3 090	688
839	$CdSO_4.7H_2O$	334 583	M.	Tr. 4	2 48	
840	$CdS_2O_6.6H_2O$	380 632	Tri.	d.	2 272	
841	CdSe	191 610	H.		$5\ 81_4^{16}$	
842	$CdSeO_4.2H_2O$	291 641	R.	d. 100	3 632	
843	CdTe	239 910	C.	1041	$6\ 20^{15}$	
844	$Cd(NO_3)_2$	236 426		350		
845	$Cd(NO_3)_2.4H_2O$	308 488		59 4	$2\ 455_4^{17}$	
846	$CdCl_2.NH_4Cl$	236 823	R.		2 93	
847	$CdCl_2.4NH_4Cl$	397 313	Trig.	Tr − 20	2 01	296
848	$CdCl_2.2NH_2OH$	249 388		d. 130	$2\ 72_{18}^{18}$	
849	$Cd(ClO_3)_2.6NH_3$	381 513		exp. 184	1 78	
850	$Cd(BrO_3)_2.4NH_3$	436 366		exp. 192	2 53	
852	$Cd(IO_3)_2.4NH_3$	530 398		exp.	3 23	
853	$CdSO_4.(NH_4)_2SO_4$	340 618		d.	3 11	
854	$CdSO_4.(NH_4)_2SO_4.6H_2O$	448 710	M.	d. 100	2 067	500
855	$CdSeO_4.(NH_4)_2SeO_4.2H_2O$	470 918	Tri.		3 376	
856	$CdSeO_4.(NH_4)_2SeO_4.6H_2O$	542 980	M.	d. 20	2 307	
857	$Cd_2P_2O_7.2H_2O$	434 899		900	$4\ 965_4^{15}$	
858	$Cd_3(PO_4)_2$	527 278		1500		
859	$5CdO.2P_2O_5.5H_2O$	1016 22	M.	d. 550	$4\ 13_4^{15}$	
860	$Cd(H_2PO_4)_2.2H_2O$	342 520	Tri.	d. 100	$2\ 742_4^{15}$	
861	$Cd_3(PO_4)_2.2CdHPO_4.4H_2O$	1016 22	M.	d. 600	4 06	
862	$3Cd_3(PO_4)_2.CdCl_2$	1765 16			$5\ 46_4^{15}$	
863	Cd_3As_2	487 150	C.		6 211	
864	$Cd_2As_2O_7$	486 740			5 974	
865	$CdHAsO_4.H_2O$	270 393		d. >120	$4\ 164_4^{15}$	
866	$Cd(H_2AsO_4)_2.2H_2O$	430 392	Tri.	d. 75	$3\ 241_4^{15}$	
867	CdSb	234 180		455		
868	$CdCO_3$	172 410	Trig.	d. <500	4 258	
869	CdC_2O_4	200 410		d. 340	$3\ 32^{18}$	
870	$Cd(CH_3)_2$	142 456				
871	$Cd(CHO_2)_2.2H_2O$	238 456	M.		2 44	
872	$Cd(C_2H_3O_2)_2$	171 433		256	2 341	
873	$Cd(C_2H_3O_2)_2.2H_2O$	207 464	M.		2 01	
874	$Cd(CH_3SO_3)_2.2H_2O$	336 602	Tri.		2 570	
875	$Cd(CN)_2$	164 426		d. >200		
876	$CdO.SiO_2$	188 470		1242	4.93	
877	$2CdO.SiO_2$	316 880		1243		
878	HgO—Montroydite	216 610	R.	d. 100	11 14	1027
879	Hg_2O	417 220		d. 100	9.8	
880	HgF	219 610	C. ?	570	8 73	
881	HgF_2	238 610	C.	645 d.	8 95	
882	HgCl—Calomel	236 068	Tet.	302	7.150	390
883	$HgCl_2$—Corrosive sublimate	271 526	R.	277	5 44 l. 4.44^{280}	
884	$Hg(ClO_3)_2$	284 068	R.	d. 250		

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
885	$HgClO_4.6H_2O$	408.160		d. 150	4.28	
886	$Hg(ClO_4)_2.7H_2O$	525.634		31 d.	2.78	
887	Hg_2ClO—Terlinguaite	452.678	M.	d.	8.725	1070
888	$HgCl_2.2HgO$	704.746	H M.	d. d.	red 8.3 black 8.5	
889	$HgO.2HgCl_2$	759.662			6.42	
890	$Hg_2O.2HgCl$—Eglestonite	889.356	C.		8.33	195
891	$HgCl_2.3HgO$—Kleinite	921.356	H.	d. 260	7.93	
892	$HgCl_2.4HgO$	1137.97	H.		9.10	
893	$HgBr$	280.526			7.307	
894	$HgBr_2$	360.412	R.	237	6.05_8 l. 5.12^{240}	
895	$HgBr_2.4HgO$	1226.88	R.	d. 230	8.73	
896	HgI	327.512	Tet.	290 d	7.70	
897	HgI_2 (red)	454.474	Tet	Tr 127	6.283	
898	HgI_2 (yellow)	454.474	R	259	6.271 l. 5.24^{266}	
899	$Hg_2Cl_2I_2$	726.000	R.	153		
900	HgS—Metacinnabarite	232.675	C		7.5_0	
901	HgS (α)—Cinnabarite	232.675	H.		8.1_0	411
902	HgS (β)	232.675	H		7.7_3	
903	$HgSO_4$	296.675	R	d	6.47	
904	Hg_2SO_4	497.285	M.	d.	7.56	
904.1	$Hg_2SO_4Cl_2$	568.201		270		
904.2	$Hg_2SO_4Br_4$	816.949		d 125		
904.3	$Hg_2SO_4I_2$	751.149		248		
905	$HgSO_4.3HgS$	994.700		d. 120	6.41_6	
906	Hg_2SeO_3	528.120		180 d		
907	$HgNO_2$	246.618		d. 140	5.925	
908	$HgNO_3.H_2O$	280.633	M.	70	$4.785^{3.9}$	
909	$Hg(NO_3)_2.0.5H_2O$	333.634		79	4.3	
910	$Hg_2(NO)_2$...	461.236		d. 100	7.33	
911	$(HgOH)_2.NH_2OH$.	468.267			4.083	
912	$HgCl_2.N_2H_4.HCl$	340.039		157		
913	$HgCl_2.2NH_4Cl.H_2O$..	396.535	R.		2.84	
914	$HgCl_2.12NH_3$	475.899		− 9 P.		
914.1	$Hg_2(NO_3)_2Cl_4$	667.068		d. 100		
915	$HgBr_2.2N_2H_4.HBr.H_2O$	603.475		73		
916	$NHg_2Br.3NH_4Br$	789.008	R.	180 d.		
916.1	$Hg_2(NO_3)_2I_4$	1032.96		250		
917	$HgS.2Sb_2S_3$—Livingstonite	912.145	R.		4.81	1029
918	$Hg(CH_3)_2$	230.656			l. 3.069	53
919	$Hg(C_2H_5)_2$	258.687			l. 2.444	54
920	$Hg(C_3H_7)_2$	286.718			l. 2.124^{16}	
921	$Hg(iso\text{-}C_4H_9)_2$	314.748			l 1.835^{15}	
922	$Hg(C_6H_5)_2$	354.687		121.8	2.318	
923	$Hg(C_{10}H_7)_2$—Mercury α-naphthyl	454.718		188	1.929	
924	$Hg(C_2H_3O_2)_2$	318.656		d.	3.27_0	
925	$Hg(C_3H_5O_2)_2$.	346.687		110		
926	$Hg(C_7H_5O_2)_2$...	442.687		165		
927	$Hg(C_{18}H_{33}O_2)_2$—Oleate	763.118		103		
928	$Hg_2(C_3H_5O_2)_2$.	547.297		225 d.		
929	$HgCH_3Cl$	251.091		170	4.063	
930	HgC_2H_5Cl	265.107		193	3.482	
931	$HgCH_3I$	342.565		143		
932	$Hg(C_2H_5S)_2$	322.817		77		
933	$Hg(CN)_2$	252.626	Tet.		4.00	
934	CuO—Paramelaconite	79.5700			6.4	
935	CuO—Tenorite	79.5700	C.	d. $1026^{152\text{ mm }O_2}$	6.4_0	1078
936	Cu_2O—Cuprite	143.140	C.	$1235^{0.6\text{ mm }O_2}$	6.0	188
937	CuF	82.5700		908		
938	$CuF_2.5HF.6H_2O$.	309.701	M.	d.	2.405	
939	$CuCl$—Nantokite	99.0280	C.	422	3.5_3	173

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
940	$CuCl_2$	134 486		49$_8$	3.054	
941	$CuCl_2.2H_2O$	170 517	R	110 d.	2 390$^{22\ 4}$	883
942	$Cu(ClO_3)_2.6H_2O$	338 578	C. ?	65		
943	$Cu(ClO_4)_2.7H_2O$	388 594			1 955	
944	$3CuO.CuCl_2.3H_2O$ – Atacamite	427 242	R.	d. 200	3 9$_4$	1033
945	$3CuO.CuCl_2.3H_2O$—Paratacamite	427 242	Trig.	d. 200	3 74	172
946	$4CuO.Cl_2O_6.3H_2O$	523 242	R. M. ?	d.	3 55	
947	$CuBr$	143 486	C.	5$_{04}$	4 72	
948	$CuBr_2$	223 402	M.	498		
949	$CuBr_2.4H_2O$	295 464	R.	Tr. 3$_0$		
950	$Cu(BrO_3)_2\ 6H_2O$	427 494	C.	d. 180	2 583	
951	CuI—Marshite	190 502	C. Tet.	605	5 6$_2$	186
952	$Cu(IO_3)_2$	413 434	M.	d.	5 241^{15}	
953	$Cu(IO_3)_2.H_2O$	431 449	Tri.	d. 240	4 876^{15}	
954	$Cu(IO_3)OH$	255 510	R.	d. 290	4 878^{15}	
955	CuS—Covellite	95 6350	H. M. ?	Tr. 103	4 6	
956	Cu_2S—Chalcocite	159 205	R.	1100	5 $_6$	
957	Cu_2S	159 205	C.	1130	5 783	
958	$CuSO_4$—Hydrocyanite	159 635	R.	200	3 $_6$	
959	$CuSO_4.H_2O$	177 650		d. 221	3 1$_7$	
960	$CuSO_4.3H_2O$	213 681	M.		2 663	
961	$CuSO_4.5H_2O$—Chalcanthite	249 712	Tri.	d. 20	2 286$^{15\ 6}_4$	641
962	$CuSO_4.7H_2O$—Boothite	285 743	M.		1 944^{21}	
963	$Cu_2SO_3.H_2O$	225 220	H.		3 83^{15}	
964	$3CuO.SO_3.2H_2O$—Antlerite	354 806	R.		3 9	921
965	$Cu_2SO_3.CuSO_3\ 2H_2O$	386 871		d. 150	3 57	
966	$4CuO.SO_3.3H_2O$—Brochantite	452 391	R.		3 907	944
967	$4CuO.SO_3.4H_2O$—Langite	470 407	R.		3 49	939
968	$7CuO.2SO_3.5H_2O$	807 197	R.		3 8$_5$	
969	$20CuO.SO_3.2CuCl_2.20H_2O$—Connellite	2300 75	H.		3 4	350
970	Cu_2Se	206 340	C.	1113	6 749$^{20}_4$	
971	Cu_3Se_2—Umangite	349 110			5 620	
972	$CuO.SeO_2.2H_2O$—Chalcomenite	226 801	M. R. ?		3 76	916
973	$CuSeO_4.5H_2O$	296 847	Tri.		2 559	
974	$Cu(NO_3)_2.3H_2O$	241 631		114 49	2 047	
975	$Cu(NO_3)_2.6H_2O$	295 678		26 4 d.		
976	$4CuO.N_2O_5.3H_2O$—Gerhardite	480 342	R.		3 43	903
977	$CuCl_2.2NH_4Cl$	241 480			1 905$^{11\ 6}_{12}$	
978	$CuCl_2\ 2NH_4Cl.2H_2O$	277 510	Tet.	d. 110	1 98	354
979	$CuCl.3NH_3$	150 121		123		
980	$2CuCl.NH_3$	215 087		162		
981	$2CuCl.3NH_3$	249 149		144		
982	$3CuCl_2.10NH_3$	573 769		27$_0$		
983	$Cu(ClO_3)_2.4NH_3$	298 610		d. 90	1 81	
984	$CuBr_2\ 2NH_3$	257 464		d. 2$_{00}$		
985	$CuBr.3NH_3$	194 579		115		
986	$2CuBr.3NH_3$	338 065		135		
987	$Cu(BrO_3)_2.4NH_3$	387 526		exp. 140	2 31	
988	$CuI.3NH_3$	241 595		105		
989	$2CuI.3NH_3$	432 097		117		
990	$Cu(IO_3)_2.5NH_3$	498 590		exp. 215	2 72	
991	$(NH_4)_2SO_4.CuSO_4$	291 778			2 348	
992	$(NH_4)_2SO_4.CuSO_4.6H_2O$	399 870	M.	d. 120	1 87	538
993	$(NH_4)_2SeO_4.CuSeO_4.6H_2O$	494 140	M.		2 22	639
994	CuP	94 5940			5 14	
995	Cu_2P	158 164		d.	6 4	
996	Cu_3P_2	252 758		d.	6 67	
997	$4CuO.P_2O_5.H_2O$—Libethenite	478 343	R.		3 7	932
998	$4CuO.P_2O_5.2H_2O$—Pseudolibethenite	496 359			4 $_0$	
999	$4CuO.P_2O_5\ 3H_2O$—Tagilite	514 374			4 08	968
1000	$5CuO.P_2O_5\ 2H_2O$—Dihydrite	575 929	M. Tri.		4 2	940
1001	$6CuO.P_2O_5.3H_2O$—Phosphochalite	673 514			4.4	
1002	$Cu(H_2PO_2)_2$	193 649		exp. 90		

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1003	$CuPO_4.CuOH$	239 172	R.			931
1004	Cu_3As—Domeykite	265 670	H.	830	8 00	
1005	$3CuO.As_2O_5.5H_2O$—Trichalcite	558 707	R.			885
1006	$4CuO.As_2O_5.H_2O$—Olivenite	566 215	R.		4 3	951
1007	$4CuO.As_2O_5.3H_2O$—Leucochalcite	602 246	R.			960
1008	$4CuO.As_2O_5.7H_2O$—Euchroite	674 308	R.		3 40	891
1009	$5CuO.As_2O_5.H_2O$—Erinite	645 785			4 04	964
1010	$6CuO.As_2O_5.3H_2O$—Clinoclasite	761 386	M.		4 37	976
1011	$7CuO.As_2O_5.14H_2O$—Chalcophyllite	1039 12	Trig.		2 66	306
1012	$5CuO.As_2O_5.9H_2O$—Tyrolite	789 909	R.		3 05	912
1013	$2Cu_2S.As_2S_3$	564 525			4 289	
1014	$3Cu_2S.As_2S_5$—Enargite	787 860	C.		4 40	
1015	$3Cu_2S.2As_2S_3$—Binnite	969 845	C.		4 48	
1016	$Cu_3(AsO_4)_2.3NH_3.4H_2O$	591 785	Tri		3 05	
1017	Cu_3Sb (β)	312 480		687 Tr. 407 (β to α)	8 51 (β) 8 48 (α)	
1018	Cu_4Sb_3	561 390		830		
1019	$Cu_2S.Sb_2S_3$—Chalcostibite	498 940	R.		4 932	
1020	$Cu_2S.2Sb_2S_3$—Guejarite	838 675	R.		4 814	
1021	$3Cu_2S.Sb_2S_3$—Stylotypite	817 350			5 147	
1022	$Cu_2S.Bi_2S_3$—Emplectite	673 400	R.		6 10^{15}	
1023	$5Cu_2S.2Bi_2S_3$—Wittichenite	1824 42			5 9^{15}	
1024	$2Cu_2S.Bi_2S_3.2BiSCl$	1385 7			6 78	
1025	$2Cu_2S.Bi_2S_3.2BiSBr$	1474 6			6 41	
1025 1	$20CuO.Bi_2O_3.5As_2O_5.22H_2O$—Mixite	3603 34			3 79	352
1026	$2CuO.CO_2$—Mysorine	203 140			4 398	
1027	$2CuO.CO_2.H_2O$—Malachite	221 155	M.		4 0	977
1028	$3CuO.2CO_2.H_2O$—Azurite	344 725	M.	d. 220	3 88	938
1029	$Cu(CHO_2)_2$	153 585			1 831	
1030	$Cu(CHO_2)_2.4H_2O$	225 647	M		1 795	652
1031	$Cu(C_2H_3O_2)_2$	181 616			1 930	
1032	$Cu(C_2H_3O_2)_2.H_2O$	199 632		115	1 882	667
1033	$Cu(C_2H_3O_2)_2.2H_2O$	217 647		d. 240	1 9	
1034	$Cu(CH_2SO_3)_2.4H_2O$—Ethane disulfonate	323 790	Tri.		2 061	
1035	$CuC_{10}H_6O_6S_2.6H_2O$—1, 5-Naphthalene disulfonate	457 839	M.		1 783	792
1036	$CuCN$	89 5780	M.	474 5		
1037	$CuC_2O_4.2NH_3$	185 632			2 305$_4^{25}$ (α) 2 225$_4^{25}$ (β)	
1038	$CuSCN$	121 613			2 846$_{15}^{5}$	
1039	$Cu_2(NH_3)_2(SCN)_2$	277 348	R.	d. 20	1 021^{25}	
1040	Cu_2Si	155 200			6 9^{18}	
1041	Cu_4Si	282 340		850	7 53	
1042	Cu_5Si_2	373 970		775		
1043	$CuO.SiO_2.H_2O$—Bisbeeite	157 645	R.			783
1044	$CuO.SiO_2.H_2O$—Dioptase	157 645	Trig.		3 05	319
1045	$2CuO.2SiO_2.H_2O$—Shattuckite	297 275	M.			948
1046	$6CuO.5SiO_2.2H_2O$—Plancheite	813 751	M.		3 36	320
1047	$CuSiF_6.6H_2O$	313 722	R.		2 158^{19}	211
1048	$CuCl_2.PbO.H_2O$—Percylite	375 701	C.		4 .67$^{16.7}$	176
1049	$2CuO.5PbO.3SO_3.CO_2.3H_2O$—Linarite	1613 38	M.		5 4	967
1050	$CuO.4PbO.P_2O_5$—Tsumebite	1114 42	R.		6	987
1051	$Cu_2S.2PbS.Bi_2S_3$—Aikinite	1151 93	R.		6 45	
1053	$5Cu_2S.2ZnS.2As_2S_3$—Tennantite	1483 14	C.		4 4	198
1054	Cu_2HgI_4	835 478			6 096$_4^0$	
1055	$CuCl.HgS$	331 703			6 29	
1056	Ag_2O	231 760	C.	d. 300	7 143$^{16.6}$	
1057	Ag_2O_2	247 760		d. >100	7 44	
1058	AgF	126 880	C.	435	5 852$^{15.5}$	
1059	$AgCl$—Cerargyrite	143.338		455	5.56	177
1060	$AgClO_3$	191 338	Tet.	230	4.430	
1061	$AgClO_4$	207 338		d. 486		
1062	$AgBr$—Bromyrite	187 796	C.	434	6.474	185

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1063	$AgBrO_3$	235 796	Tet	d.	5.206	372
1064	AgI—Iodyrite	234 812	H.	d. 552	5.67	400
1065	$AgIO_3$	282 812	R.	>200	5 525	
1066	Ag_2S Acanthite	247 825	R.	825 Tr. 175	7 326	
1067	Ag_2S - Argentite	247 825	C.	Tr. 175	7.317	
1068	Ag_2SO_4	311 825	R.	652	5.45_4^{29} ^{2}	
1069	$Ag_2S_2O_6.2H_2O$	411 921	R.		3 61	844
1070	Ag_2Se—Naumannite	294 960		880	8 0	
1071	Ag_2SeO_3	342 960			5 929	
1072	Ag_2Te Hessite	343 260	C.	955	8 5	
1073	AgN_3	149 904		exp. 251 5		
1074	$AgNO_2$	153 888	R.	d 140	4.453^{26}	
1075	$AgNO_3$	169 888	R.	212	4.352_4^{19}	1050
1076	$Ag_2(NO)_2$	275 776		d. 110	$5\ 75_4^{30}$	
1077	$AgNO_3.NH_3$	170 919	Tet.	70 d		
1078	$NH_4NO_3.AgNO_3$	249 935	R.	109 6		
1079	$Ag(NH_3)_2NO_3$	203 950	R.	170 d		
1080	$AgCl.AgNO_3$	313 226		160		
1081	$2AgCl.3NH_3$	337 769	R.	68 d.		
1082	$AgI.AgNO_3$	404 700	R.	94		
1083	$AgI.2AgNO_3$	574 588	R.	119 1		
1084	$AgBr.NH_4Br.4(NH_4)_2S_2O_3$	878 580	Tet.			336
1085	Ag_2P_3	308 832		d.	4 63	
1086	$AgPO_3$	186 904		482	6 370	
1087	Ag_3PO_4	418 664	C.	849	$6\ 370_4^{25}$	
1088	$Ag_4P_2O_7$	605 568		585	$5\ 306^{7\ 5}$	
1089	Ag_2HPO_4	311 792	Trig.	d. 110		366
1090	Ag_3AsO_3	446 600		150 d		
1091	Ag_3AsO_4	462 600	C.		$6\ 657_4^{25}$	
1092	Ag_3AsBr_4	638 348		d.	$5\ 55_4^{25}$	
1093	$Ag_2S.As_2S_3$ Smithite	493 940	M.		4 700	1066
1094	$Ag_2S.As_2S_3$—Trechmannite	493 940	Trig.		4 700	422
1095	$3Ag_2S.As_2S_3$ Proustite	989 590	Trig.		5 49	412
1096	$3Ag_2S.As_2S_5$—Xanthoconite	1053 72	R.		5 2	1030
1097	$Ag_2S.Sb_2S_3$- Miargyrite	587 560	M.		$5\ 36_{17}^{17}$	
1098	$3Ag_2S.Sb_2S_3$—Pyrargyrite	1083 21	Trig.		5 76	425
1099	$3Ag_2S.Sb_2S_3$— Pyrostilpnite	1083 21	M. Tri.		$5\ 790_{17}^{17}$	
1100	$5Ag_2S.Sb_2S_3$—Stephanite	1578 86	R.		6 3	
1101	$8Ag_2S.Sb_2S_3$—Polybasite	2322 34	R.		6 1	1031
1102	$12Ag_2S.Sb_2S_3$—Polyargyrite	3313 64	R.		6 50	
1103	$Ag_2S.Bi_2S_3$—Matildite	762 020	R.		6 9	
1104	$AgNO_3.Bi(NO_3)_3.2NH_4NO_3$	629 006			$3\ 055_4^{15}$	
1105	Ag_2CO_3	275 760		218 d.	6 077	
1106	$Ag_2C_2O_4$	303 760		exp. 140	$5\ 029^{4}$	
1107	$AgC_2H_3O_2$	166 903		d.	$3\ 259^{16}$	
1108	$AgC_3H_5O_3.0\ 5H_2O$ - Lactate	205 995		100		
1109	$Ag_2(d\text{-}C_4H_4O_6)$	363 791		d	$3\ 432^{15}$	
1110	$Ag_2(dl\text{-}C_4H_4O_6)$	363 791			3.775^{15}	
1111	$AgCN$	133 888		320 d.	3 95	
1112	$AgCNO$	149 888		d.	4 00	
1113	$AgCN.NH_3$	150 919	M.	102 d.		
1114	$Ag(SbO)(d\text{-}C_4H_4O_6).H_2O$	364 886	R.		$3\ 481^{18\ 2}$	
1115	$4Ag_2S.GeS_2$—Argyrodite	1127 81	C.		$6\ 085^{15}$	
1116	$4Ag_2S.SnS_2$- Canfieldite	1174 13	C.		6 28	
1117	$Ag_2S.2As_2S_3.6PbS$ - Lengenbachite	2175 65	Tri.		5 8	
1118	$3Ag_2S.4PbS.3Sb_2S_3$—Diaphorite	2719 74	R.		5 9	
1119	$3Ag_2S.4PbS.3Sb_2S_3$—Freieslebenite	2719 74	M.		6 3	
1120	$AgNO_3.2TlNO_3.Bi(NO_3)_3$	1001 73			$4\ 87_4^{15}$	
1121	$AgCl.HgCl$	379 406			6 495	
1122	$2AgI.HgI_2$	924 098		Tr. 45	5.998_4^{0}	
1123	$4AgI.CuI$- Miersite	1129 75			5 64	183
1124	$Ag_2S.Cu_2S$—Stromeyerite	407 030	R.		6 2	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1125	Au_2O	410.400		d. 20$_5$		
1126	Au_2O_2	426.400		d. 18$_0$		
1127	Au_2O_3	442.400		d. 16$_0$		
1128	$AuCl$	232.658		d. 289.5	7.4	
1129	$AuCl_3$	303.574		254 d.	3.9	
1130	Au_2Cl_4	536.232		d. 25$_0$	5.1	
1131	$AuBr$	277.116		d. 115		
1132	$AuBr_3$	436.948		16$_0$ d.		
1133	Au_2Br_4	714.064		d. 115		
1134	$AuHBr_4.5H_2O$	607.949		27		
1135	AuI	324.132		d. 120		
1136	Au_2S_2	458.530		d. 14$_0$		
1137	Au_2S_3	490.595		d. 19$_7$	8.754	
1138	Au_2Se_3	632.000			4.65^{22}	
1139	AuTe—Calaverite	324.700	Tri.		9.04	
1140	Au_2Te_4	904.400		47$_2$		
1141	$HAu(NO_3)_4.3H_2O$	500.286		7$_2$ d.	2.84	
1142	$Au_2O_3.4NH_3$	510.524		exp. 143		
1143	Au_2P_3	487.472			6.67	
1144	$Au(CN)_3.3H_2O$	329.270		d. 50		
1145	$4AuCl_3.3AgCl.8NH_4Cl$	2072.28	R.			159
1146	OsO_2	222.800			7.91	
1147	OsO_4 (yellow)	254.800	M.	41	4.91 l 4.41$^{40.1}$	57
1147.5	OsO_4 (white)	254.800		39.5		
1148	OsF_6	304.800				
1149	OsF_8	342.800		34.5		
1150	$(NH_4)_2OsCl_6$	439.626	C.		2.93	
1151	$(NH_4)_2OsBr_6$	706.374			4.09	
1152	$IrCl$	228.558		d. 798	10.18	
1153	$IrCl_2$	264.016		d. 773		
1154	$IrCl_3$	299.474		d. 763	5.30	
1155	$(NH_4)_2IrCl_6$	441.926	C.		2.856	
1156	$IrCl.4NH_3.H_2O$	314.698	Trig.			327
1157	$[Ir(NH_3)_5Cl]Cl_2$	384.630	R		2.675	
1158	$[Ir(NH_3)_5Br]Br_2$	518.004	R.		3.245$^{16.5}$	
1159	$[Ir(NH_3)_5Cl]Br_2$	473.546	R.		3.01	
1160	$[Ir(NH_3)_5I]I_2$	659.052	R.		3.586$^{16.5}$	
1161	$[Ir(NH_3)_5Cl]I_2$	567.578	R.		3.12	
1162	$Ir_2(SO_4)_3.(NH_4)_2SO_4.24H_2O$	1238.91	C.	106		
1163	$PtCl_2$	266.146		d. 5$_8$1	5.87	
1164	$PtCl_4.8H_2O$	481.185			2.43	
1165	$H_2PtCl_6.6H_2O$	518.086		60	2.431	
1166	$PtBr_4$	514.894		d. 180		
1167	$H_2PtBr_6.9H_2O$	838.880	M.	<100 d.		
1168	PtI_4	702.958		d. 100		
1169	PtS	227.295			8.897	
1170	$PtSe_2$	353.630			7.65	
1171	$PtSe_3$	432.830			7.15	
1172	$Pt(NH_3)_4(OH)_2$	297.370		110 d.		
1173	$Pt(NH_3)_2Cl_2$	300.208	R.	d. 270		
1174	$(NH_4)_2PtCl_6$	444.056	C.		3.065	
1175	$[Pt(NH_3)_4]Cl_2.H_2O$	352.286	Tet.	d. 110	2.737	
1176	$(NH_4)_2PtBr_6$	710.804	C.		4.265	
1177	$(NH_4)_2PtI_6$	992.900	C.		4.61	
1178	PtP_2O_7	369.278		d. >600	4.856	
1179	$PtAs_2$—Sperrylite	345.150	C.	>800	10.60	
1180	$[Pt(CO)Cl_2]_2$	588.292		195		
1181	$2PtCl_2.3CO$	616.292	M.	130		
1182	$[Pt(CO)Br_2]_2$	766.124	M.	182		
1183	$[Pt(CO)I_2]_2$	954.188		*ca.* 150 d.		
1184	$[CH_3(C_2H_5)_2SCl]_2PtCl_4$	618.308	M.	210		888
1185	$[(C_2H_5)_3SCl]_2PtCl_4$	646.339	M.			811

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1186	$[C_2H_5NH_2]_2H_2PtCl_6$	500 117		218 d.	2 275^{18}	
1187	$[(CH_3)_3N]_2H_2PtCl_6$	528 148		245 d.	2 015	139
1188	$[CH_3(C_2H_5)NH]_2H_2PtCl_6$	528 148		208	2 115^{15}	
1189	$[C_3H_7NH_2]_2H_2PtCl_6$	528 148		214	2 218	
1190	$[(iso\text{-}C_3H_7)NH_2]_2H_2PtCl_6$	528 148		228	2 229	
1191	$[(CH_3)_4N]_2PtCl_6$	556 179	C.	278 d.	1.811^{16}	
1192	$[CH_3(C_3H_7)NH]_2H_2PtCl_6$	556 179		200 d.	1 968^{15}	
1193	$[(CH_3)_3C_2H_5N]_2PtCl_6$	584 210	C.	266 d.	1.762^{17}	
1194	$[(C_2H_5)C_3H_7NH]_2H_2PtCl_6$	584 210		199	1.89	
1195	$[C_2H_5(iso\text{-}C_3H_7)NH]_2H_2PtCl_6$	584 210		180	1 885	
1196	$[C_2H_5(iso\text{-}C_4H_9)NH]_2H_2PtCl_6$	612 240		201 d.	1 804	
1197	$[(C_2H_5)_3N]_2H_2PtCl_6$	612 240		100	1 903	
1198	$[(C_3H_7)_2NH]_2H_2PtCl_6$	612 240		175 d.	1 704^{15}	
1199	$[(CH_3)_3C_3H_7N]_2PtCl_6$	612 240	C.	252 d.	1 821	
1200	$[(CH_3)_3(iso\text{-}C_3H_7)N]_2PtCl_6$	612 240	C.	237	1 871^{16}	
1201	$[(C_3H_7)(iso\text{-}C_4H_9)NH]_2H_2PtCl_6$	640 271		188	1 702^{15}	
1202	$[(CH_3)(C_2H_5)_3N]_2PtCl_6$	640 271	C.	250 d.	1 731	
1203	$[(CH_3)_2(C_2H_5)(C_3H_7)N]_2PtCl_6$	640 271	C.	256 d.	1 812	
1204	$[(CH_3)_3(C_4H_9)N]_2PtCl_6$	640 271	C.	259 d.	1 795	
1205	$[(CH_3)_3(iso\text{-}C_4H_9)N]_2PtCl_6$	640 271	C.	220	1 751^{17}	
1206	$[(CH_3)(C_3H_7)_2N]_2H_2PtCl_6$	640 271		>200	1 737	
1207	$[(C_2H_5)_4N]_2PtCl_6$	668 302	C.	250 d.	1 776	
1208	$[(iso\text{-}C_4H_9)_2NH]_2H_2PtCl_6$	668 302		213	1.62^{15}	
1209	$[(C_2H_5)(C_3H_7)_2N]_2H_2PtCl_6$	668 302		175	1.726	
1210	$[(CH_3)_2(C_3H_7)_2N]_2PtCl_6$	668 302	Tet.	250	1.745	
1211	$[(C_2H_5)_3(C_3H_7)N]_2PtCl_6$	696 333	C.	235 d.	1 710	
1212	$[(CH_3)(C_2H_5)(C_3H_7)_2N]_2PtCl_6$	696 333	C.	228 d.	1 712	
1213	$[(C_2H_5)_2(C_3H_7)_2N]_2PtCl_6$	724 364	C.	220 d.	1 677	
1214	$[(CH_3)(C_2H_5)(C_3H_7)(iso\text{-}C_4H_9)N]_2PtCl_6$	724 364		236 d.	1 637	
1215	$[(C_2H_5)_3(C_4H_9)N]_2PtCl_6$	724 364	C.	220	1 629^{15}	
1216	$[(C_2H_5)_3(iso\text{-}C_4H_9)N]_2PtCl_6$	724 364	M.	215	1 602	
1217	$[(C_2H_5)(C_3H_7)_3N]_2PtCl_6$	752 394	Tri.	212	1 571^{17}	
1218	$[(C_3H_7)_4N]_2PtCl_6$	780 424	Tri.	199	1 515	
1219	$[(CH_3)(iso\text{-}C_4H_9)_3N]_2PtCl_6$	808 456	R. ?	174	1 696	
1220	$[(C_2H_5)(iso\text{-}C_4H_9)_3N]_2PtCl_6$	836 487	Tet.	170	1 562^{17}	
1221	$[(C_3H_7)(iso\text{-}C_4H_9)_3N]_2PtCl_6$	864 518	C.	168	1 509	
1222	$Pt_x(NO_2)_y(C_aH_bS_c)_z$	Tschugaeff	and Chlopi	n, *93*, **82**: 402; 12.		
1223	$PtSi$	223 290		1100	11 63^{15}	
1224	Pt_2Si	418 520			13 8^{18}	
1225	Pt_3Si_2	641.810			14 1	
1226	$PtPbCl_6.4H_2O$	687 240	C.		3 681	
1227	$PtPbBr_6$	881 926		d. >120	6 025	
1228	$PtZnCl_6.6H_2O$	581 450	Trig.		2 717	
1229	$PtZnBr_6.12H_2O$	956 291	Trig.		2 877	
1230	$PtZnI_6.9H_2O$	1184 34	Trig.		3 689	
1231	$PtCdCl_6.6H_2O$	628 480	Trig.		2 882	
1232	$PtCuCl_6.6H_2O$	579 964	Trig.		2 734	
1233	RuO_2	133 700	Tet.		7 2	
1234	RuO_4	165 700		25 5	5 77^{100}	
1235	Ru_2S_3—Laurite	299 595	C.		6 99	
1236	$RuSi$	129 760			5 4	
1237	$[Rh_2(NH_3)_{10}Cl_2]Cl_4$	588 879	R.	d. 200	2 079^{18}	
1238	$[Rh(NH_3)_5Br]Br_2$	427.814	R.		2 65	
1239	$[Rh(NH_3)_5I]I_2$	568 862	R.		3.12^{16}	
1240	$NH_4Rh(SO_4)_2.12H_2O$	529 264	C.	103		115
1241	$TlRh(SO_4)_2.12H_2O$	715 625	C.			130
1242	$RbRh(SO_4)_2.12H_2O$	596 665	C.	109		
1243	PdO	122 700		d. 877		
1244	$PdCl_2$	177 616		500		
1245	PdI_2	360 564		d. 350		
1246	PdS	138 765		950		
1247	Pd_2S	245 465		800 d.	7.3	
1248	$PdSe$	185 900		<960		

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1249	$Pd(NH_3)_2Cl_2$	211 678	Tet.		2 5	
1250	$(NH_4)_2PdCl_4$	284 610	Tet.		2 17	
1251	$(NH_4)_2PdCl_6$	355 526	C.		2 418	
1252	$(NH_4)_2PdSO_3Cl_2.H_2O$	365 268	Trig.			316
1253	$Pd(CO)Cl_2$	205 616		197		
1254	$Pd(CO)_2Cl_2$	233 616		142		
1255	$2PdCl_2.3CO$	439 232		132		
1256	PdSi	134 760			7 31^{15}	
1257	$ZnPdCl_4.6H_2O$	492 920	H.		2 359	
1258	MnO—Manganosite	70 9300	C.	1650	5 18	180
1259	$MnO.H_2O$—Pyrochroite	88 9454	Trig.		3 258^{13}	349
1260	MnO_2—Polianite, Pyrolusite	86 9300	R.		5 026	
1261	$MnO_2.H_2O$	104 945	C.			171
1262	Mn_2O_3	157 860	C.		4 50	
1263	$Mn_2O_3.H_2O$—Manganite	175 875	R.		3 258	1058
1264	Mn_3O_4—Hausmannite	228 790	Tet.		4 700	121
1265	MnF_2	92 9300		856	3 98	
1266	MnF_3	111 930			3 54	
1267	$MnF_2.5HF.6H_2O$	301 061			1 921	
1268	$MnCl_2$—Scacchite	125 846	C.	650	2 977$^{25}_{4}$	
1269	$MnCl_2.4H_2O$	197 908	M.	58 01	2 01	
1270	$Mn(ClO_4)_2.8H_2O$	397 969			1 99	
1270.1	$MnCl_2.3MnO_2.3H_2O$—Kempite	440 682	R.		2 94	889
1271	$MnBr_2$	214 762			4 385$^{25}_{4}$ fused	
1272	$MnBr_2.4H_2O$	285 820	M.	64 3d		
1273	MnS—Alabandite	86 9950	C.	d.	3 99	107
1274	MnS_2—Hauerite	119 060	C.		3 463	106
1275	$MnSO_4$	150 995		700	3 25	
1276	$MnSO_4.H_2O$—Szmikite	169 010	M. ?		2 954	742
1277	$MnSO_4.2H_2O$	187 .026			2 526	
1278	$MnSO_4.3H_2O$	205.041			2 356	
1279	$MnSO_4.4H_2O$	223 057	M. R.		2 107	
1280	$MnSO_4.5H_2O$	241 072	Tri.		2 103	
1281	$MnS_2O_6.6H_2O$	323 152	Tri		1 757	
1282	MnSe	134.130	C.		5 59^{15}	
1283	$MnSeO_4.2H_2O$	234 161	R		2 949	
1284	$MnSeO_4.5H_2O$	288 207	Tri.		2 334	
1285	Mn_5N_2	302 666			6 63	
1286	$Mn(NO_3)_2.3H_2O$	232 992		34 81		
1287	$Mn(NO_3)_2.6H_2O$	287 038		25 8	1 82	
1288	NH_4MnO_4	136 969	R.		2 208$^{10.8}$	
1289	$(NH_4)_2SO_4.MnSO_4.6H_2O$	391 229	M.		1 831	484
1290	$(NH_4)_2SO_4.2MnSO_4$	434 133	C.		2 56^{14}	
1291	$(NH_4)_2SO_4.Mn_2(SO_4)_3$	530 196			2 40^{11}	
1292	$(NH_4)_2SeO_4.MnSeO_4.6H_2O$	485 500	M.		2 093	
1293	Mn_6P_2	391 628			4 94	
1294	$Mn_2P_2O_7$	283 908	M.		3 707$^{25}_{4}$	897
1295	$3MnO.P_2O_5.3H_2O$—Reddingite	408 884	R.		3 1	842
1296	$3MnO.P_2O_5.4H_2O$?—Stewartite	426 898	Tri.		2 94	846
1297	$5MnO\ 2P_2O_5.4H_2O$—Palaite	710 808	M.		3 17	843
1298	$5MnO.2P_2O_5.5H_2O$—Hureaulite	728 823	M.		3 18	835
1299	$3MnO.As_2O_5$—Armangite	442 710	H. R.		4 23	
1300	$4MnO.As_2O_5.H_2O$—Sarkinite, Polyarsenite	531 655	M.		4 15	954
1301	$Mn_2O_3.4MnO.As_2O_5.4H_2O$—Flinkite	743 562	R.		3 87	959
1302	$6MnO.As_2O_5.5H_2O$—Hemafibrite	745 577	R.		3 6	980
1303	$7MnO.As_2O_5.4H_2O$—Allactite	798 492	M.		3 84	945
1304	MnSb	176 700			5 6^{17}	
1305	$10MnO.Sb_2O_5$—Manganostibite	1032 84	M.			989
1306	Mn_3C	176 790			6 89^{17}	
1307	$MnCO_3$—Rhodochrosite	114 930	Trig.		3 125	368
1308	MnC_2O_4	142 930			2 43$^{21.7}$	
1309	$Mn(CHO_2)_2$	144 945			2 205	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1310	$Mn(CHO_2)_2.2H_2O$	180.976	R.		1.953	
1311	$Mn(C_2H_3O_2)_2$	172.976			1.74	
1312	$Mn(C_2H_3O_2)_2.4H_2O$	245.038	M.		1.589	
1313	$MnCl_2.2C_5H_5N.HCl$	320.405		17_5		
1314	$MnSi$	82.9900		1280	5.90^{15}	
1315	$MnSi_2$	111.050			5.24^{15}	
1316	Mn_2Si	137.920		1316	6.20^{15}	
1317	$MnO.SiO_2$	130.990		1273	3.48_4^{25}	63
1318	$MnO.SiO_2$—Rhodonite	130.990	Tri.	1323	3.72_4^{25}	929
1319	$2MnO.SiO_2$—Tephroite	201.920	R.	130_0	4.043_4^{25}	949
1320	$3Mn_2O_3.MnO.SiO_2$—Braunite	604.570	Tet.		4.7_8	
1321	$8MnO.7SiO_2.5H_2O$—Bementite	1077.94	R.		2.9_0	803
1322	$12MnO.8SiO_2.7H_2O$—Ectropite	1457.75	M. ?		2.46	1044
1323	$MnSiF_6.6H_2O$	305.082	Trig.	d.	$1.904^{17.5}$	206
1324	$5MnO.SiO_2.As_2O_3.H_2O$—Dixenite	630.645	H.		4.2	385
1324.1	$12MnO.9SiO_2.As_2O_5.7H_2O$—Schallerite.	1747.73			3.368	344
1325	$MnO.TiO$—Pyrophanite	150.830	Trig.	1404	4.54	405
1326	$2MnO.6PbO.3As_2O_5.H_2O$—Trigonite	2188.84	M.		8.28	1004
1327	$2Mn_2O_3.3PbO.3SiO_2$—Kentrolite	1165.44	R.		6.19	1014
1328	$2Mn_2O_3.3CuO$—Crednerite	554.430			$5._0$	
1329	$MnPtCl_6.6H_2O$	571.000	Trig.	d.	2.692	
1330	$MnPtCl_6.12H_2O$	679.093	Trig.		2.112	
1331	$MnPtBr_6.12H_2O$	945.841	Trig.		2.759	
1332	$MnPtI_6.9H_2O$	1173.89	Trig.	d	3.604	
1333	FeO	71.8400		142_0		
1334	Fe_2O_3—Hematite	159.680	Trig.	156_0 d	5.1_2	424
1335	$Fe_2O_3.H_2O$—Goethite	177.695	R.		4.28	1026
1336	$Fe_2O_3.H_2O$—Lepidocrocite	177.695	R.		4.09	1013
1337	Fe_3O_4—Magnetite	231.520	C.	1538 d	$5._2$	
1338	FeF_2	93.8400			4.0_9	
1339	FeF_3	112.840			3.18	
1340	$FeCl_2$—Lawrencite	126.756	H.		2.7	280
1341	$FeCl_2.4H_2O$	198.818			1.93	
1342	$FeCl_3$—Molysite	162.214	H.	282	2.8	
1343	$2FeCl_3.2HCl.4H_2O$	469.421		45.7		
1344	$FeBr_2$	215.672			4.636_4^{25}	
1345	$FeBr_3.6H_2O$	403.680		27		
1346	FeI_2	309.704		177		
1347	$FeI_2.4H_2O$	381.764			2.87	
1348	FeS—Troilite	87.9050	H.	119_3	4.8	
1349	FeS_2—Marcasite	119.970	R.	Tr 450	4.87	
1350	FeS_2—Pyrite	119.970	C.		5.0	
1351	Fe_2S_3	207.875			4.3	
1352	Fe_3S_4	295.780			4.55	
1353	Fe_7S_8—Pyrrhotite	647.400	H.	d. >700	4.6	
1354	$FeSO_4.H_2O$—Szomolnokite	169.920	M.		3.08	
1355	$FeSO_4.5H_2O$—Siderotilate	241.982	Tri.		2.2	642
1356	$FeSO_4.7H_2O$—Melanterite	278.012	M.		1.89	471
1357	$Fe_2O_3.2SO_3.7H_2O$—Amarantite	445.918	Tri.		2.11	762
1358	$Fe_2O_3.2SO_3.10H_2O$—Fibroferrite	499.964	R.		1.86	255
1359	$Fe_2O_3.3SO_3.9H_2O$—Coquimbite	562.014	Trig.		2.1	270
1360	$Fe_2O_3.4SO_3.9H_2O$—Rhomboclasite	642.079	R.			675
1361	$FeO.Fe_2O_3.4SO_3.24H_2O$—Bilinite	984.150			1.87	530
1362	$2Fe_2O_3.SO_3.6H_2O$—Glockerite	507.517				958
1363	$2Fe_2O_3.5SO_3.18H_2O$—Copiapite	1043.96	R.		2.1	654
1364	$3Fe_2O_3.4SO_3.10H_2O$—Carphosiderite	979.454	Trig.		2.6	371
1365	$Fe_2O_3.3TeO.4H_2O$—Durdenite	662.242	R.			990
1366	Fe_2N	125.688		d.	6.35	
1367	$Fe(NO_3)_3.6H_2O$	349.956		35		
1368	$(NH_4)_2SO_4.FeSO_4.6H_2O$	392.140	M.		1.864	513
1369	$(NH_4)_2SO_4.Fe_2(SO_4)_3.24H_2O$	964.387	C.		1.71	102
1370	$(NH_4)_2SeO_4.FeSeO_4.6H_2O$	486.410	M.		2.160	612
1371	FeP	86.8640			5.2	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1372	Fe_3P	142.704		1290	5.7	
1373	Fe_2P_3	204.752			4.5	
1374	Fe_2P	198.544		1110	6.74	
1375	Fe_3P_4	291.616			5.04	
1376	$Fe(PO_3)_3$	292.912			3.02	
1377	$Fe_2O_3.P_2O_5.4H_2O$—Strengite	373.790	R.		2.87	917
1378	$3FeO.P_2O_5.8H_2O$—Vivianite	501.691	M.		2.58	757
1379	$2Fe_2O_3.P_2O_5.12H_2O$—Cacoxenite	677.593	H.		3.38	285
1380	$3Fe_2O_3.2P_2O_5.8H_2O$—Beraunite	907.259	M.		2.9	950
1381	$7FeO.2P_2O_5.9H_2O$—Ludlamite	949.115	M.		3.72	873
1382	$2Fe_2O_3.P_2O_5.2SO_3.2H_2O$—Destinezite	657.569	Tri		2.1	794
1383	$2Fe_2O_3.P_2O_5.2SO_3.2H_2O$—Diadochite	657.569			2.0	142
1384	$FeAs$	130.800		1020	7.83	
1385	$FeAs_2$—Arsenoferrite	205.760	C.	990	7.4	
1386	$FeAs_2$—Löllingite	205.760	R.		7	
1387	$FeAsO_4.4H_2O$—Scorodite	266.862	R.		3.2	941
1388	$3FeO.As_2O_5.8H_2O$—Symplesite	589.563	M.		2.96	857
1389	$3Fe_2O_3.2As_2O_5.13H_2O$—Pharmacosiderite	1109.08	M. ?, C		3	874
1390	$FeS_2.FeAs_2$—Arsenopyrite	325.730	R.		6.2	
1391	$2FeO.Sb_2O_5$—Tripuhyite	467.220			5.82	1015
1392	$FeS.Sb_2S_3$—Berthierite	427.640	R.		4.0	
1393	Fe_3C	179.520		1837	7.4	
1394	$FeCO_3.H_2O$—Siderite	133.855	Trig.		3.8	377
1395	$FeC_2O_4.2H_2O$	179.871	R.	d. 160	2.28	
1396	$Fe(CO)_4$	167.840		d. 140	1.996^{18}	
1397	$Fe(CO)_5$	195.840		−21	l 1.457	
1398	$Fe_2(CO)_9$	363.680		d. 100	2.085^{18}	
1399	$FeC_{20}H_{14}O_6S_2.6H_2O$—Naphthalene-β-sulfonate	578.170				1039
1400	$(NH_4)_4Fe(CN)_6.2NH_4Cl.3H_2O$	445.083	Trig.		1.490	301
1401	$Fe_4(NO)_7S_3N(C_2H_5)_4$	659.773			1.883^{19}_{19}	
1402	$FeSi$	83.9000			6.1	
1403	$FeSi_2$	111.960			5.4	
1404	Fe_2Si	139.740			7.0	
1405	Fe_3Si_2	223.640			6.7	
1406	$FeO.SiO_2$—Gruenerite	131.900	M.	1550	3.5	890
1407	$2FeO.SiO_2$—Fayalite	203.740	R.	1255		978
1408	$2Fe_2O_3.2SiO_2.3H_2O$—Iddingsite	493.526	R.		2.8	928
1409	$FeSiF_6.6H_2O$	305.992	Trig.			207
1410	$FeO.TiO_2$—Ilmenite	151.740	Trig.		4.75	
1411	$Fe_2O_3.3TiO_2$—Arizonite	399.380	M. ?		4.25	1069
1412	$2Fe_2O_3.3TiO_2$—Pseudobrookite	559.060	R.		4.7	1061
1413	$6FeO.Sb_2O_3.5TiO_2$—Derbylite	1122.08	R.		4.53	420
1414	$2Fe_2O_3.PbO.3SO_3.4H_2O$—Vegasite	851.817	H.			555
1415	$3Fe_2O_3.PbO.4SO_3.6H_2O$—Plumbojarosite	1130.59	Trig.		3.63	378
1416	$3Fe_2O_3.2PbO.P_2O_5.2SO_3.6H_2O$—Corkite	1335.71	Trig.		4.2	383
1417	$5Fe_2O_3.3PbO.6As_2O_5$—Carminite	2847.52			4.1	
1418	$FeS.3Sb_2S_3.4PbS$—Jamesonite	1967.98	M.		5.7	
1419	$3Fe_2O_3.2PbO.As_2O_5.2SO_3.6H_2O$—Beudantite	1423.58	Trig.		4.1	386
1420	$9Fe_2O_3.4PbO.6As_2O_5.4SO_3.33H_2O$—Lossenite	4622.21	R.			952
1421	$2Fe_2O_3.3PbO.3SiO_2$—Melanotekite	1169.14	R.		5.73	1010
1422	$TlFe(SO_4)_2.12H_2O$	668.555	C.		2.38	124
1423	$Zn(FeO_2)_2$	241.060			5.33	
1424	$Fe_2O_3.CuO$	239.250		1458		
1425	$FeS.CuS$—Chalcopyrite	183.540	Tet.		4.2	
1426	$FeS.2Cu_2S.CuS$—Bornite	501.950	C.		5.0	
1427	$2FeS.CuS$—Cubanite	271.415	R.		4.0	
1428	$4FeS.Cu_2S.2CuS$	702.095			5.0	
1429	$4FeS.3Cu_2S.3CuS$	1116.14			4.85	
1430	$3Fe_2O_3.CuO.2P_2O_5.8H_2O$—Chalcosiderite	986.829	Tri.		3.1	969
1431	$Fe_2O_3.2CuO.As_2O_5.2H_2O$—Chenevixite	584.771			3.93	379

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1432	$FeS.Cu_2S.SnS_2$—Stannite	429.940	Tet.		4.4	
1433	$Fe_2O_3.CuO.PbO.2SO_3.4H_2O$—Beaverite	694.642	H.		4.36	373
1434	$2Ag_3Fe(CN)_6.3NH_3$	1122.15			2.45	
1435	$FePtCl_6.6H_2O$	571.910			2.7	
1436	$FePtI_6.9H_2O$	1174.80			3.45	
1437	$FeO.MnO_2$—Bixbyite	158.770	C.		4.95	
1438	$Fe_2O_3.MnO$—Jacobsite	230.610	C.		4.75	
1439	$Fe_2O_3.9MnO.4P_2O_5.14H_2O$—Salmonsite	1618.46	R.		2.88	848
1439 1	$9(MnFe)O.8SiO_2.MnCl_2.7H_2O$—Friedelite		Trig.		3.1	329
1440	CoO	74.9700	C.	d. 80_0	5.6_8	
1441	Co_2O_3	165.940			5.1_8	
1442	Co_3O_4	240.970			6.07_3	
1443	$Co(OH)_2$	92.9854		d.	3.597^{15}	
1444	CoF_2	96.9700	M.		4.43	
1445	$CoF_2.3H_2O$	151.016			2.583^{25}_{25}	
1446	$CoF_2.5HF.6H_2O$	305.101	Trig.		2.045	
1447	$CoCl_2$	129.886			3.356	
1448	$CoCl_2.2H_2O$	165.917			2.477^{25}_{25}	
1449	$CoCl_2.6H_2O$	237.978	M.	86	1.924^{25}_{25}	
1450	$Co(ClO_3)_2.6H_2O$	333.978		61	1.92	
1451	$Co(ClO_4)_2.6H_2O$	365.978	H.	143		131
1452	$Co(ClO_4)_2.7H_2O$	383.994			2.075	
1453	$CoBr_2$	218.802			4.909^{25}_{4}	
1454	$CoBr_2.6H_2O$	326.894		100 d.		
1455	CoI_2	312.834			5.68	
1456	$Co(IO_3)_2.6H_2O$	516.926			3.689^{21}	
1457	CoS—Syepoorite	91.0350		>1100	5.45	
1458	Co_3S_4—Linnaeite	305.170	C.		$4._9$	
1459	$CoSO_4$	155.035			3.710^{25}_{25}	
1460	$CoSO_4.H_2O$	173.050		d.	1.92	
1461	$CoSO_4.4H_2O$	227.096			2.368^{25}_{25}	
1462	$CoSO_4.6H_2O$	263.127	M.		2.029^{25}_{25}	
1463	$CoSO_4.7H_2O$—Bieberite	281.143	M. ?		1.948^{25}_{25}	481
1464	$CoSe$	138.170			7.65	
1465	$CoSeO_4.5H_2O$	292.247	Tri.	d.	2.512	
1466	$CoSeO_4.6H_2O$	310.262	M.		2.32	599
1467	$CoSeO_4.7H_2O$	328.278	M.		2.135	
1468	$Co(NO_3)_2.3H_2O$	237.032		91		
1469	$Co(NO_3)_2.6H_2O$	291.078	M.	<100	1.883^{25}_{25}	
1470	$Co(NO_2)_3.3NH_3$	248.087			2.001^{32}_{4}	
1471	$[Co(NH_3)_4(NO_2)_2]NO_3$	281.118	R.		1.922^{17}	
1472	$Co(NO_3)_2.6NH_3$	285.173			1.473^{25}_{25}	
1473	$CoF_2.6NH_3$	199.157			1.744^{25}_{25}	
1474	$CoCl_2.NH_3$	146.917		*ca.* 321		
1475	$CoCl_2.2NH_3$ (α)	163.948		27_3	2.097^{25}_{25}	
1476	$CoCl_2.2NH_3$ (β)	163.948			2.073^{25}_{25}	
1477	$CoCl_2.4NH_3$	198.010		d.	1.593^{25}_{25}	
1478	$CoCl_2.5NH_3$	215.042			1.580^{25}_{25}	
1479	$[Co(NH_3)_5Cl]Cl_2$	250.500	R.		1.819^{25}_{25}	
1480	$CoCl_2.6NH_3$	232.073		d.	1.497^{25}_{25}	
1481	$CoCl_3.6NH_3$	267.531	M.		1.744^{25}_{25}	
1482	$CoCl_2.10NH_3$	300.197			1.71^{25}_{25}	
1483	$[Co(NH_3)_4(OH_2)Cl]Cl_2$	251.484	R.		1.847	
1484	$[Co(NH_3)_5(NO_2)]Cl_2$	261.050	M.		1.698^{18}	
1485	$[Co(NH_3)_5(NO_2)](NO_3)Cl$	287.500	R.		1.800	
1486	$CoBr_2.2NH_3$	252.864		26_0		
1487	$[Co(NH_3)_5Br]Br_2$	383.874		d.	$2.483^{17.8}_{4}$	
1488	$CoBr_2.6NH_3$	320.989			1.955	
1489	$[Co(NH_3)_5Br]Cl_2$	294.958			$2.095^{16.8}$	
1490	$CoI_2.2NH_3$	346.896		22_2		
1491	$(NH_4)_2SO_4.CoSO_4.6H_2O$	395.270	M.		1.901	521
1492	$Co(SO_4)_2.4NH_3.2H_2O$	355.255			1.804^{25}_{25}	
1493	$Co(SO_4)_2.5NH_3$	336.256			1.703^{25}_{25}	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1494	$[Co(NH_3)_5(SO_4)]SO_4H.2H_2O$	373.294	R.		1.828^{18}	
1495	$[Co(NH_3)_5(OH_2)]_2(SO_4)_3.3H_2O$	666.523	Tet.		1.854	
1496	$[Co(NH_3)_6]Cl(SO_4).3H_2O$	346.726	R.		1.765	
1497	$(NH_4)_2SeO_4.CoSeO_4.6H_2O$	489.540	M.	d.	2.212	623
1498	$Co(NH_3)_6Cl(SeO_4).3H_2O$	393.861	R.		1.937	
1499	$Co(H_2PO_2)_2.6H_2O$	297.141			$1.800_4^{18.5}$	
1500	$CoAs_2$—Safflorite	208.890		d.	6.97^0	
1501	$CoAs_2$—Smaltite	208.890		d.	$6.{}_5$	
1502	$CoAs_3$—Skutterudite	283.850			6.7_9	
1503	Co_2As_3	342.820		d.	7.35^0	
1504	Co_3As_2	326.830		d.	7.82^0	
1505	$Co_3(AsO_4)_2.8H_2O$—Erythrite	598.953	M.		2.9	850
1506	$CoAsS$—Cobaltite	165.995	C.	d.	$6.{}_2$	
1507	$CoCO_3$—Spherocobaltite	118.970	Trig.		2.818_4^{15}	375
1508	CoC_2O_4	146.970			2.325_4^{19}	
1509	$Co(CO)_4$	170.970		51	1.73^{18}	
1510	$Co(CHO_2)_2.2H_2O$	185.016			2.129^{22}	
1511	$CoC_3H_2O_4.2H_2O$—Malonate	197.016			2.279	
1512	$Co(C_2H_3O_2)_2.4H_2O$	249.078	M.		$1.7^{18.7}$	651
1513	$Co(C_5H_7O_2)_2$—Acetylacetonate	356.132				
1514	$CoC_{10}H_6O_6S_2.6H_2O$—1, 5-Naphthalenedisulfonate	453.239	M.		1.77	799
1515	$Co(CO)_3NO$	172.978		−1.05	1.1513^{14}	
1516	$[Co(NH_3)_5(C_2O_4)]NO_3.HNO_3$	357.149			1.264^{15}	
1517	$CoSi$	87.0300		1393	6.30	
1518	$CoSi_2$	115.090		1277	5.3^0	
1519	$CoSi_3$	143.150		1307		
1520	Co_2Si	146.000		1327	7.1^{17}	
1521	Co_2SiO_4	210.000			4.63	
1522	$CoSiF_6.6H_2O$	309.122	Trig.		2.087	413
1523	$CoSnCl_6.6H_2O$	498.510	R. Trig.		2.699	
1524	$CoPtCl_6.6H_2O$	575.040	Trig.	d.	2.699	
1525	$CoPtBr_6.12H_2O$	949.881	Trig.		2.762	
1526	$CoPtI_6.9H_2O$	1177.93	Trig.		3.618	
1527	$CoPtI_6.12H_2O$	1231.98	Trig.		3.048	
1528	NiO—Bunsenite	74.6900	C.		7.45	201
1529	Ni_2O_3	165.380			4.8_3	
1530	$Ni_3O_4.2H_2O$	258.085			3.41_2^{32}	
1531	NiF_2	96.6900			4.63	
1532	$NiF_2.3H_2O$	150.736			2.014^{19}	
1533	$NiF_2.5HF.6H_2O$	304.821	Trig.		2.132	
1534	$NiCl_2$	129.606			3.54_4	
1535	$Ni(ClO_3)_2.6H_2O$	333.698		80 d.	2.07	
1536	$Ni(ClO_4)_2.6H_2O$	365.698	H.	149		132
1537	$Ni(ClO_4)_2.7H_2O$	383.714			2.15	
1538	$NiBr_2$	218.522			4.64_4^{28}	
1539	$Ni(IO_3)_2$	408.554			5.07	
1540	$Ni(IO_3)_2.4H_2O$	480.616	H.	d. *ca.* 100		
1541	NiS—Millerite	90.7550	Trig.	79_7	4.60	
1542	Ni_2S	149.445			5.52	
1543	Ni_3S_2	240.200		794 Tr. 545		
1544	Ni_3S_4—Polydymite	304.330	C.		$4.{}_7$	
1545	$NiSO_4$	154.755			3.6_8	
1546	$NiSO_4.H_2O$	172.770			1.98	
1547	$NiSO_4.6H_2O$	262.847	Tet. M.	Tr. 53.3	2.07	246
1548	$NiSO_4.7H_2O$—Morenosite	280.863	R.		1.948	501
1549	$NiS_2O_6.6H_2O$	326.912	Tri.	d.	1.908	
1550	$NiSe$	137.890			8.46	
1551	$NiSeO_4.6H_2O$	309.982	Tet.		2.31	262
1552	$Ni(NO_3)_2.6H_2O$	290.798	M.	56.7	2.05	
1553	$NH_4Cl.NiCl_2.6H_2O$	291.195	M.		1.645	
1554	$Ni(ClO_3)_2.6NH_3$	327.793		180	1.52	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1555	$Ni(BrO_3)_2.6NH_3$	*416.709*		exp. 195	1.99	
1556	$Ni(IO_3)_2.5NH_3$	*493.710*			2.97	
1557	$(NH_4)_2Ni(SO_4)_2.6H_2O$	*394.990*	M.		1.923	539
1558	$(NH_4)_2Ni(SeO_4)_2.6H_2O$	*489.260*	M.	d.	2.22	643
1559	NiP_2	120.738			4.62^{18}	
1560	NiP_3	151.762			4.19^{18}	
1561	Ni_2P	148.404		1112	6.3^{15}	
1562	Ni_3P_2	238.118			5.99	
1563	$Ni(H_2PO_2)_2.6H_2O$	296.861		d.	1.824	
1564	NiAs—Nicollite	133.650	H.	968	7.57^0	
1565	$NiAs_2$—Rammelsbergite	208.610	R.		7.1	
1566	Ni_3As_2—Maucherite	325.990	Tet.		7.86^0	
1567	Ni_5As_2	443.370		998 Tr. 970		
1568	$Ni_3(AsO_4)_2$	453.990			4.982	
1569	$3NiO.As_2O_5.8H_2O$—Annabergite	598.113	M.		3.0	845
1570	NiAsS—Gersdorffite	165.715			$6._3$	
1571	NiSb—Breithauptite	180.460	H.	1158	7.70^0	
1572	Ni_5Sb_2	536.990		1170		
1573	NiSbS—Ullmannite	212.525	C.		$6._6$	
1574	NiC_2O_4	146.690			2.235	
1575	$Ni(CO)_4$	170.690		−25	l. 1.310	
1576	$3NiO.CO_2.H_2O$—Zaratite	286.085			2.6	136, 143
1577	$Ni(CHO_2)_2.2H_2O$	184.736			2.154	
1578	$Ni(C_2H_3O_2)_2$.	176.736			1.798	
1579	$Ni(C_2H_3O_2)_2.4H_2O$	248.798			$1.744^{15.7}$	
1580	$NiC_{10}H_6O_6S_2.6H_2O$—1, 5-Naphthalene disulfonate	452.959	M.		1.79	808
1581	Ni_2Si	145.440		1309	7.2^{17}	
1582	$2NiO_2.3SiO_2.2H_2O$—Connarite	397.590	H.		2.5	292
1583	$NiSiF_6.6H_2O$	308.842	Trig.	d.	2.134	210
1584	$NiPdCl_6.6H_2O$	486.230	H.		2.353	
1585	$3NiO.6CuO.2As_2O_5.SO_3.7H_2O$—Lindackerite	1367.50	M. ?		2.2_5	851
1586	$NiPtCl_6.6H_2O$.	574.760	Trig.		2.798	
1587	$NiPtBr_6.6H_2O$.....	841.508	Trig.		3.715	
1589	CrO_3	100.010	R.	19_0 d.	2.7	
1590	Cr_2O_3	152.020	H.	190_0	5.21	
1591	$Cr_4O_3.3H_2O$	310.086			2.90	
1592	Cr_5O_9	404.050			4	
1593	CrF_2	90.0100		11_{00}	4.1_1	
1594	CrF_3	109.010	R.	>1000	3.8	
1595	$CrCl_2$	122.926			2.75	
1596	$CrCl_3$	158.384			2.7	
1597	CrO_2Cl_2	154.926		−96.5	l. 1.836	
1598	$(CrO_2)_5Cl_6$	632.798			2.5	
1599	CrS	84.0750			4.1	
1600	Cr_2S_3	200.215			3.7	
1601	$Cr_2(SO_3)_3$	344.215			2.2	
1602	$Cr_2(SO_4)_3$	392.215			3.0	
1603	$Cr_2(SO_4)_3.17H_2O$	698.476			1.7	
1604	H_2CrSO_7	198.090		19_0 d.		
1605	H_2CrSeO_7	245.225		200		
1606	$(NH_4)_2CrO_4$	152.088	M.		1.8	
1607	$CrO_4.3NH_3$	167.103	R.		1.96	
1608	$(NH_4)_2Cr_2O_7$	252.098	M.		2.1_5	
1609	$(NH_4)_2Cr_3O_{10}$	352.108	R.		2.33	
1610	$(NH_4)_2Cr_4O_{13}$	452.117		170	2.3_4	
1611	$NH_4IO_3.CrO_3$	292.981	R.		3.5	
1612	$(NH_4)_2CrSO_7$	232.153		160		
1613	$Cr_2(SO_4)_3.(NH_4)_2SO_4.24H_2O$	956.727	C.	100 d.	1.72	101
1614	CrP	83.0340			5.7	
1615	$Cr(PO_3)_3$.......	289.082			2.9_7	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1616	$Cr_4(P_2O_7)_3$	730 184	M.		3 2	
1617	Cr_2As_3	328 900			6 2	
1618	$4CrO_3.As_2O_5.2(NH_4)_2O.H_2O$	752 131		d 175	1 8$_3$	
1619	Cr_3C_2	180 030		18$_{90}$	6 6$_8$	
1620	Cr_4C	220 040			6 7$_5$	
1621	Cr_5C_2	284 050		16$_{65}$	6 9$_2$	
1622	$CrC_2O_4.H_2O$	158 025			2 46	
1623	$Cr(d\text{-}C_4H_4O_6)$	200 041			2 33^{15}	
1624	$Cr[CH(COCH_3)_2]_3$—Acetylacetonate	349 172		214		
1625	$[Cr(CON_2H_4)_6]Cl_3.3H_2O$	572 711		15$_0$		
1626	$[Cr(CON_2H_4)_6](CN)_3.5.5H_2O$	589 400		75		
1627	$[Cr(CON_2H_4)_6](SCN)_3$	586 510		90 d.		
1628	$CrSi_2$	108 130			4 4	
1629	Cr_3Si	184 090			6 5$_2$	
1630	Cr_3Si_2	212 150			5 5	
1631	$PbCrO_4$—Crocoitite	323 210	M.	844	6 3	1060
1632	$3PbO.2CrO_3$—Phoenicochroite	869 620			5 7$_5$	
1633	$TlCr(SO_4)_2.12H_2O$	664 725	C.		2 3$_8$	122
1634	$ZnCr_2O_4$	233 400			5 3	
1635	$(NH_4)_2Cr_2O_7.HgCl_2$	523 624	M		3 1$_1$	
1636	Ag_2CrO_4	331 770			5 625	
1637	$Ag_2Cr_2O_7$	431 780			4 770	
1638	$MnO.Cr_2O_3$	222 950			4 87	
1639	$FeCr_2O_4$—Chromite	223 860	C.		4 5	181
1640	$NiCr_2O_6Cl_2.9H_2O$	491 765		47		
1641	MoO_2	128 000	Tet.		4 516$^{19\ 5}$	
1642	MoO_3	144 000	R.	795	4 50$^{19\ 5}$	
1643	$Mo_5O_{14}.6H_2O$	812 092			3 6^{18}	
1644	H_2MoO_4	162 015	H	d 115		
1645	H_4MoO_5	180 031	M Tri ?		3 124^{15}	
1646	MoF_6	210 000		17		
1647	MoO_2F_2	166 000			3 494	
1648	$MoOF_4$	188 000		98	3 001	
1649	$MoCl_5$	273 290		194		
1650	MoI_2	349 864			4 3	
1651	MoS_2—Molybdenite	160 130	H	1185	4 8	
1652	Mo_2S_3	288 195			5 9^{15}	
1653	$(NH_4)_2MoO_4$	196 078	M.		2 270	
1654	$18MoO_3.14NH_3.3H_2O_2.18H_2O$	3256 76	M.		2 975	
1655	Mo_2P_2	254 048			6 17	
1656	$Mo(PO_3)_3$	333 072			3 28^0	
1658	$MoCl_5.POCl_3$	426 688		127		
1659	$18MoO_3.As_2O_5.28H_2O$	3326 35	Tri.		3 088	
1660	$18MoO_3.As_2O_5.38H_2O$	3506 51	Tri.	d.	2 822	
1661	$Bi_2O_3.MoO_3$—Koechlinite	610 000	R.			1065
1662	MoC	108 000		2570	8 40	
1663	Mo_2C	204 000		23$_{80}$	8 9	
1664	$Mo(CO)_6$	264 000			1 95	
1665	$3C_2H_4(NH_2)_2.HSCN.Mo(OH)(SCN)_3$	462 447		128 d.		
1666	$MoSi_2$	152 120			6 1	
1667	$TiO_2.12MoO_3.22H_2O$	2204 24	Tet.	60		
1668	$PbMoO_4$—Wulfenite	367 200	Tet.	1068	6 7	419
1669	$2PbO.MoO_3$	590 400		951		
1670	$Fe_2O_3.3MoO_3.7.5H_2O$—Molybdite	774 796	R.		4 5	919, 936, 953
1671	$WO_3.H_2O$—Tungstite	250 015	R.	1473	5 5 ?	1018
1672	WF_6	298 000		2 5		
1673	WOF_4	276 000		11$_0$		
1674	WCl_5	361 290		24$_8$		
1675	WCl_6	396 748		27$_5$		
1676	WO_2Cl_2	286 916				
1677	$WOCl_4$	341 832		21$_1$		
1678	WBr_5	583 580		27$_6$		

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1679	$WOBr_4$	519 664		277		
1680	$WCl_4.3WBr_4$	2387 24		232		
1681	WI_2	437 864			6 9^{18}	
1682	WI_4	691 728			5 2^{18}	
1683	WS_2	248 130			7 5^{10}	
1684	WP	215 024			8 5	
1685	WP_2	246 048			5 8	
1686	W_4P_2	798 048			5 21	
1687	$24WO_3.P_2O_5.45H_2O$	6520 74	C.		4 68	
1688	WAs_2	333 920			6 9^{18}	
1689	WC	196 000		2777	15 7^{18}	
1690	W_2C	380 000		2877	16 06^{18}	
1691	W_3C	564 000		>2700		
1692	WSi_2	240 120			9 3^{0}	
1693	W_2Si_3	452 180			10 9	
1694	$PbO.WO_3$—Raspite	455 200	M.	1123		1023
1695	$PbO.WO_3$ Stolzite	455 200	Tet.		8 23	401
1696	$CuO.WO_3$ Cuprotungstite	311 570	Tet.			1007
1697	$MnO\ WO_3$ Hübnerite	302 930	M.		7 2	1017
1698	$FeO.WO_3$ - Ferberite	303 845	Tet.		6 64	1062
1699	$Fe_2O_3.WO_3.6H_2O$—Ferritungstite	499 772	H.			364
1700	$NiO.WO_3$	306 690	R.		6 88$^{20\ 5}$	
1701	$3Cr_3C_2.W_2C$	920 090			8 4^{22}	
1702	UO_2—Uraninite	270 170	R.		10 5	
1703	UO_3	286 170			5 92	
1704	$UO_4\ 2H_2O$	338 201		d. 115		
1705	U_3O_8—Pitchblende	842 510			7 31	
1706	UF_6	352 170	M.		4 68	
1707	$(UO_2)(ClO_4)_2\ 4H_2O$	541 148		110 d.		
1708	$(UO_2)(ClO_4)_2.6H_2O$	577 178		90		
1709	UBr_4	557 834			4 84	
1710	UI_4	745 898		500	5 6	
1711	$UO_2(IO_3)_2$	620 034	R.	d. 250	5 2	
1712	$UO_2(IO_3)_2\ H_2O$	638 049			5 05	
1713	$UO_2SO_4.3H_2O$	420 281		d. 100	3 28	
1714	$UO_2NO_3.6H_2O$	440 270	R.	59	2 742	
1715	$UO_2(NO_3)_2\ 3H_2O$	448 232		120		
1716	$UO_2(NO_3)_2.6H_2O$	502 278	R.	d. 100	2 81	525
1717	$(NH_4)_2(UO_2)(NO_3)_4.2H_2O$	590 310			2 78	
1718	$(NH_4)_2(UO_2)(SO_4)_2\ 2H_2O$	534 408			3 01	
1719	$UO_2.2P_2O_5$	554 266	R.		3 9	
1720	$3UO_2.P_2O_5.6H_2O$—Phosphuranylite	1060 65	C.			906
1721	$3UO_3.As_2O_5.12H_2O$—Troegerite	1304 61	M.		3 3	802
1722	$Bi_2O_3\ 2UO_3\ 3H_2O$—Uranospherite	1060 39	R.		6 36	993
1723	$5Bi_2O_3\ 3UO_3.2As_2O_5.12H_2O$—Walpurgite	3816 53	Tri.		5 76	997
1724	UC_2	262 170		2260	11 3^{15}	
1725	U_2C_3	512 340		2400	11 28	
1726	$UO_3.CO_2$—Rutherfordine	330 170	Tet.		5 6	935
1727	$UO_2C_2O_4$	358 170			2 98	
1728	$UO_2(CHO_2)_2.H_2O$	378 201		d. 110	3 69^{19}	
1729	$UO_2(C_2H_3O_2)_2.2H_2O$	424 247	R.	d. 275	2 89^{15}	
1730	$(NH_4)_4(UO_2)(CO_3)_3\ 2H_2O$	558 356			2 77	
1731	$UO_2(C_2H_3O_2)_2\ NH_4C_2H_3O_2$	465 278	Tet.			223
1732	USi_2	294 290			8 0	
1733	$12U_2O_3.5SiO_2.14H_2O$- Soddite	6844 60	R.		4 627	
1734	$U_5Pb_2O_{17}.4H_2O$—Curite	1949 31			7 19	
1735	$8UO_3.4PbO.3P_2O_5\ 12H_2O$--Dewindtite	3824 49			4 8	
1736	$UPbSiO_6.1.33H_2O$—Kasolite	593 450	M.		5 96	
1737	$Cu(UO_2)_2P_2O_8.8H_2O$--Metatorbernite I	938 081	Tet.		3 5	303
1738	$CuO.2UO_3.P_2O_5.8H_2O$—Torbernite	938 081	Tet.		3.5	737
1739	$CuO.2UO_3\ As_2O_5.8H_2O$—Zeunerite	993.953	Tet.		3 2	317
1740	VO	66.9600			5 758^{14}	
1741	VO_2	82 9600		>1755	4.399	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1742	V_2O_2	133 920			3 64	
1743	V_2O_3	149 920		1970	$4\ 87_4^{18}$	
1744	V_2O_5	181 920		800	3 357	
1745	VF_3	107 960	R.		$3\ 363^{19}$	
1746	VF_4	126 960		d. 325	$2\ 975^{23}$	
1747	VF_5	145 960			$2\ 177^{19}$	
1748	VOF_2	104 960		d.	$3\ 396^{19}$	
1749	VOF_3	123 960		300	2 459	
1750	VCl_2	121 876	H.		$3\ 23^{18}$	
1751	VCl_3	157 334			$3\ 00^{18}$	
1752	VCl_4	192 792		−109	l. $1\ 816^{30}$	
1753	VOCl	102 418			2 824	
1754	$VOCl_2$	137 876			$2\ 88^{13}$	
1755	$VOCl_3$	173 334		< −15	l. 1 829	
1756	V_2O_3Cl	201 378			3 64	
1757	VOBr	146 876		d. 480	$4\ 00^{18}$	
1758	$VOBr_3$	306 708			$2\ 933^{14\ 5}$	
1759	V_2S_2	166 050			4 200	
1760	V_2S_3	198 115			$4\ 7^{21}$	
1761	V_2S_5	262 245			3 000	
1762	$V_2O_4.3SO_3.16H_2O$—Minasragrite	694 361	M. Tri.			619
1763	VN	64.9680		2050	5 630	
1764	$(NH_4)_3VS_4$	233 336			1 620	
1765	$(NH_4)_4V_2S_6O$	382 465			1 716	
1766	$Bi_2O_3.V_2O_5$—Pucherite	647 920	R.		$6\ 25^{24\ 5}$	1064
1767	VC	62 9600		2830	5 4	
1768	V_4C_3	239 840		2750^{5mm}		
1769	$(NH_4)_2VO(CNS)_4.5H_2O$	425 407	R.	58		
1770	VSi_2	107 080			4 42	
1771	V_2Si	129 080			$5\ 48^{17}$	
1772	$PbO.V_2O_5$	405.120		849		
1773	$2PbO.V_2O_5$	628 320		722		
1774	$3PbO.V_2O_5$	851 520		952		
1775	$8PbO.V_2O_5$	1967 52		794		
1776	$9PbO.3V_2O_5.PbCl_2$—Vanadinite	2832 68	H.		6.863	403
1777	$TlVO_3$	303 360		424		
1778	Tl_3VO_4	728 160		566		
1779	$Tl_4V_2O_7$	315 200		454		
1780	$Tl_6V_4O_{13}$	1638 24			$8\ 59^{17.5}$	
1781	$4(PbZn)O.V_2O_5.H_2O$—Descloizite		R.		6 0	1021
1782	$Cd_{10}V_6Cl_2O_{24}$	1884 78	H.		$5\ 264^{15}$	
1783	$Cd_{10}V_6Br_2O_{24}$	1973 69	H.		$5\ 456^{15}$	
1784	$2PbO.2CuO.V_2O_5.H_2O$—Cuprodescloizite	805 475	R.		6.1	1020
1785	$Ag_4V_2O_7$	645 440		383		
1786	$5(NH_4)_2O.P_2O_5.3V_2O_5.15MoO_3.39H_2O$	3810 80			2 410	
1787	$6(NH_4)_2O.P_2O_5.6V_2O_5.12MoO_3.41H_2O$	4012 67			2 411	
1788	$3(NH_4)_2O.SiO_2.V_2O_5.9MoO_3.20H_2O$	2054 52			$2\ 802^{18}$	
1789	$3(NH_4)_2O.SiO_2.V_2O_5.10MoO_3.21H_2O$	2216 54			$2\ 804^{18}$	
1790	$3(NH_4)_2O.SiO_2.V_2O_5.11MoO_3.27H_2O$	2468 63	M. ?		2 807	
1791	$3(NH_4)_2O.SiO_2.V_2O_5.15MoO_3.24H_2O$	2990 58			2 816	
1792	$3(NH_4)_2O.SiO_2.V_2O_5.9WO_3.24H_2O$	2918 58			3 40	
1793	$3(NH_4)_2O.SiO_2.V_2O_5.10WO_3.21H_2O$	3096 53			3 43	
1794	$2UO_3.3V_2O_5.15H_2O$—Uvanite	1388 33	R.			979
1795	Cb_2O_5	266 200		1520	$4\ 60_4^{61\ 2}$	
1796	CbF_5	188.100		75 5	3 29	
1797	$CbCl_5$	270 390		194	2 75	
1798	$CbOCl_3$	215 474				
1799	CbC	105 100				
1800	Cb_2FeO_6—Ferroniobite	338 040	R.		6 26	1063
1801	Ta_2O_5	443 000	R.	1470 d.	$8\ 735_4^{21.2}$	
1802	TaF_5	276 500		96 8	4 74	
1803	$TaCl_5$	358 790		221	$3\ 68^{27}$	
1804	$TaBr_5$	581 080		240		

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No
1805	TaC	193 500				
1806	$TaSi_2$	237 620			8.83^{0}	
1807	$Ta_2O_6.MnO$ — *Manganotantalate*	513 930	R.		7.03	1019
1808	B_2O_3	69 6400			l. 1.85 glass	26
1809	$B_2O_3.3H_2O$ — *Sassolite*	123 686	Tri.	d.	1.49	448
1810	B_2H_6	27 6862		−169		
1811	B_4H_{10}	53 3570		−112		
1812	$B_{10}H_{14}$	122 308		99.5	0.94	
1813	BF_3	67 8200		−127		
1814	BCl_3	117 194		−107	l. 1.434^{0}_{4}	
1815	BBr_3	250 568		− 45	l. 2.60	
1816	B_2HBr	102 564		−104		
1817	BI_3	391 616		43	l. 3.3^{50}	
1818	B_2S_3	117.835		310	1.55	
1819	BN_3	38 8360				
1820	NH_4BF_4	104 859			1.851^{17}	
1821	CB_6	76 9200		2350	2.6	
1822	$B(CH_3)_3$	55.8893		56		
1823	$B(C_2H_5)_3$	97.9355			l. 0 696^{23}	
1824	$B(OCH_3)_3$	103 889			l. 0 915	
1825	$B(OC_2H_5)_3$	145 936			l. $0.864^{26.5}$	11
1826	$B(OC_3H_7)_3$	187 982			l. 0.867^{16}	
1827	$B(OC_4H_9)_3$ — Isobutyl	230 028			l. 0.864^{0}	14
1828	$B(OC_5H_{11})_3$ — Isoamyl	272 074			l. 0 872^{0}	17
1829	SiB_3	60 5200			2 52	
1830	SiB_6	92 9800			2 47	
1831	Zr_3B_4	316 280			3 7	
1833	ThB_4	275 430			7 5	
1834	ThB_6	297 070			6 4	
1835	$TlBO_2$	247 220		472		
1836	Tl_3BO_3	672 020		370 d.		
1837	$Tl_4B_2O_5$	919 240		434		
1838	$B_2O_3.CdO$	198 050		875		
1839	$B_2O_3.CuO$	149 210		d. 875	3 86	
1840	MnB_2	76 5700			6.9	
1841	$Mn_3B_4O_9$	352 070	Tri.		3 61	923
1842	FeB	66 6600			7.15	
1843	Fe_2B	122 500			7 4	
1844	FeB_2	77 4800			5 0	
1845	Fe_2B_5	165 780		1340		
1846	Fe_5B_2	300 840		1351		
1847	CoB	69 7900			7.25	
1848	Co_2B	112 740			7.9	
1849	NiB	69.5100			7.4	
1850	Ni_2B	128 200		1225	8.0	
1851	Ni_3B_2	197.710		1160		
1852	CrB	62 8300			5 5	
1853	Cr_3B_2	177.670			6.7^{15}	
1854	Mo_3B_4	331 280			7	
1855	WB_2	205 640			10.8	
1857	$B_2O_3.9WO_3.2NiO.18H_2O$	2631 30	M.	80	l. 3 6^{80}	
1858	Al_2O_3 — Corundum	101.920	Trig.	2050	4 00	359
1859	$Al_2O_3.H_2O$ — Diaspore	119 935	R.	d. 360	3 413	911
1860	$Al_2O_3.3H_2O$ — Gibbsite	155 966	M.	d. 200	2.423	692
1861	$Al(OH)_3$	77 9831	M.			632
1862	AlF_3	83.9600	Tri.	1040	3.07	
1863	$AlF_3.H_2O$ — Fluellite	101 975	R.		2 17	507
1864	$AlCl_3$	133 334	H.	194	2.44^{25}_{4} l. 1.31^{200}_{4}	
1865	$AlBr_3$	266 708	Trig.	97.5	3 01^{25}_{4} l. 2 64^{100}_{4}	
1866	$AlBr_3.15H_2O$	536 939		− 7 5 m		
1867	$Al(BrO_3)_3.9H_2O$	572 847		62.3		

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1868	$AlBrCl_2$	177.792		143		
1869	AlI_3	407.756		191	3.98 1.320_4^{200}	
1870	Al_2S_3	150.115	H.	1100	2.02	
1871	$Al_2O_3.SO_3.9H_2O$—Aluminite	344.124	M.	d.	1.705^0	453
1872	$Al_2O_3.2SO_3$—Alumian	262.050	Trig.		2.7_4	286
1873	$Al_2O_3.3SO_3$	342.115		d. 770	2.71	
1874	$Al_2O_3.3SO_3.18H_2O$—Alunogenite	630.361	M		1.69_1^{17}	468
1875	$2Al_2O_3.SO_3.10H_2O$—Felsoebanyite	461.059	R		2.33	587
1876	$2Al_2O_3.SO_3.15H_2O$—Paraluminite	554.136				462
1877	AlN	40.9680	R.	2150		
1878	$Al(NO_3)_3.9H_2O$	375.123	R.	73		
1879	$AlCl_3.NH_4Cl$	186.831		304		
1880	$AlCl_3.3NH_3$	184.427		280 d.		
1881	$Al_2(SO_4)_3.(NH_4)_2SO_4$	474.258			2.039	
1882	$Al_2O_3.(NH_4)_2O.4SO_3.24H_2O$ Tschermigite	906.628	C.	93.5	1.64	81
1883	$AlPO_4$	121.984	H.		2.59	
1884	$Al_2O_3.P_2O_5.4H_2O$—Metavariscite	316.030	R.	>1500	2.54	680
1885	$Al_2O_3.P_2O_5.6H_2O$—Lucinite	352.060	R		2.566	724
1886	$Al_2O_3.P_2O_5.6H_2O$—Zepharovichite	352.060		>1500	2.37	664
1887	$Al_2O_3.3P_2O_5$	528.064			2.779	
1888	$2Al_2O_3.P_2O_5.3H_2O$—Augelite	399.934	M	d.	2.77	712
1889	$5Al_2O_3.2P_2O_5.9H_2O$—Spherite	955.835	R.	d.	2.536	711
1890	$Al(AsCl)_3$	358.214			2.85_4^{24}	
1891	Al_4C_3	143.840			2.36	
1892	$Al_2O_3.C_{12}O_9.18H_2O$—Mellite	714.197	Tet.		1.64	260
1893	$Al(CH_3)_3$	72.0293				19
1894	$Al(C_2H_5)_3$	114.076				29
1895	$Al(C_5H_7O_2)_3$—Acetylacetonate	324.122		191		
1896	$Al(OC_6H_5)_3$	306.076		*ca.* 265	1.23	
1897	$NH_3(CH_3)Al(SO_4)_2.12H_2O$	467.329	C.		1.568	75
1898	$Al_2O_3.SiO_2$—Andalusite	161.980	R.	d.	3.2	815
1899	$Al_2O_3.SiO_2$—Cyanite	161.980	Tri.	d.	3.6	907
1900	$Al_2O_3.SiO_2$—Sillimanite	161.980	R.	d. <1550	3.23	819
1901	$Al_2O_3.2SiO_2.2H_2O$—Kaolinite	258.071	M		2.6	690
1902	$Al_2O_3.2SiO_2.4H_2O$—Newtonite	294.102	Tet		2.37	274
1903	$Al_2O_3.4SiO_2.H_2O$—Pyrophyllite	360.175	R.		2.8_5	727
1904	$3Al_2O_3.2SiO_2$—Mullite	425.880	R	1810 d.	3.15_6	
1905	$2(AlF)O.SiO_2$—Topaz		R		3.58	784
1906	Al_3Ti_2	176.680	Tet.		3.348	
1907	$3Al_2O_3.2PbO.2P_2O_5.7H_2O$—Plumbogummite	1162.36	H	d.	4.014	325
1908	$3Al_2O_3.2PbO.2SO_3.P_2O_5.6H_2O$—Hinsdalite	1162.43	H.		3.65	865
1909	$2Al(OH)_3.Pb(HCO_3)_2$—Dundasite	485.182			3.25	
1910	$Al_2(SO_4)_3.Tl_2SO_4.24H_2O$	1279.35	C.	91	2.320	107
1911	$Al_2O_3.ZnO$—Automolite (Gahnite)	183.300	C.		4.58	161
1912	$3Al_2O_3.6ZnO.2SO_3.18H_2O$—Zincaluminite	1278.45	H.	d	2.26	256
1913	$Al_2O_3.4CuO.SO_3.8H_2O$—Cyanotrichite	644.388	R		2.737	779
1914	$(AlCl)O.6CuO.SO_3.9H_2O$—Spangolite		Trig.	d	3.14	340
1915	$3Al_2O_3.CuO.2P_2O_5.9H_2O$—Turquoise	831.565	Tri	d. 300	2.67	782
1916	$4Al_2O_3.18CuO.5As_2O_5.55H_2O$—Liroconite	3980.39	M	d.	2.96	830
1917	$Al_2O_3.MnO$	172.850	C		4.12	
1918	$Al_2O_3.MnO.4SO_3.24H_2O$—Apjohnite	925.480	M.		1.782	477
1919	$Al_2O_3.2MnO.P_2O_5.4H_2O$—Eosphorite	457.890	R.		3.1_3	837
1920	$Al_2O_3.MnO.2SiO_2.2H_2O$—Carpholite	329.001	R.		2.94	801
1921	$Al_2O_3.3MnO.3SiO_2$—Spessartite	494.890	C.		4.180	167
1922	$Al_2O_3.7MnO.8SiO_2.6H_2O$—Ganophyllite	1187.00	M.		2.84	914
1923	$Al_2O_3.FeO$—Hercynite	173.760	C.		3.9_3	165
1924	$Al_2O_3.FeO.4SO_3.24H_2O$—Halotrichite	926.390	M.		2.04	505
1925	$Al_2O_3.FeO.P_2O_5.11H_2O$—Paravauxite	513.977	Tri.	d.	2.3	681
1926	$Al_2O_3.2FeO.P_2O_5.4H_2O$—Childrenite	459.710	R.	d.	3.2_3	876

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1927	$2Al_2O_3.4FeO.3P_2O_5.24H_2O$—Vauxite	1349.71	Tri.		2.45	677
1928	$Al_2O_3.3FeO.3SiO_2$—Almandite	497.620	C.		4.04	166
1929	$Al_2O_3.3FeO.2SiO_2.3H_2O$—Daphnite	491.606	M.			826
1930	$5Al_2O_3.2FeO.4SiO_2.H_2O$—Staurolite	910.528	R.		3.7	930
1931	$Al_2O_3.CoO$	176.890	C.		4.37_4^{18}	
1932	$3Al_2O_3.4CoO$	605.640			4.80	
1933	AlB_{12}	156.800	M.		2.5	
1934	$Al_2O_3.B_2O_3$—Jeremejevite	171.560	H.		3.3	313
1935	$BO_3(AlO)_3$	187.700	R.			758
1936	$C_2B_{12}.3AlB_{12}$	624.240	Tet		2.61_5	
1937	$8Al_2O_3.B_2O_3.6SiO_2.H_2O$—Dumortierite	1263.38	R.		3.3	886
1938	Sc_2O_3	138.200			3.86_4	
1939	$ScCl_3$	151.474		93_9		
1940	$ScBr_3$	284.848			3.91	
1941	$Sc_2(SO_4)_3$	378.395			2.57_9	
1942	$Sc(NO_3)_3$	231.124		15_0		
1943	$Sc(NO_3)_3.4H_2O$	303.186		d. 1_{00}		
1944	$Sc_2O_3.2SiO_2$—Thortveitite	258.320	R.		3.57	946
1945	Yt_2O_3	226.000		24_{10}	4.84	
1946	$YtCl_3$	195.374		$<68_6$	2.8_4^{18}	
1947	$YtCl_3.H_2O$	213.389		16_0		
1948	$Yt(BrO_3)_3.9H_2O$	634.887		74		
1949	$Yt_2(SO_4)_3$	466.195			2.61_2	
1950	$Yt_2(SO_4)_3.8H_2O$	610.318	M.		2.55_8	661
1951	$Yt_2O_3.P_2O_5$—Xenotime	368.048	Tet.		$4._6$	348
1952	$Yt_4(P_2O_7)_3$	878.144			3.059	
1953	YtC_2	113.000			4.13	
1954	$Yt(CH_3CO_2)_3.4H_2O$	338.131	Tri.		1.696	
1955	$Yt(C_2H_5SO_4)_6.18H_2O$	1163.90	H.		1.764_4^{25}	238
1956	$2Yt_2O_3.4SiO_2.H_2O$—Thalenite	710.255	M.		4.23	925
1957	$Yt_2Pt_3(CN)_{12}.21H_2O$	1453.90	R.		2.376	
1957.1	$Yt_2(MoO_4)_3$	658.000		1347	4.79^{16}	415
1958	La_2O_3	325.820		>2000	6.51	
1959	$LaCl_3$	245.284		90_7	3.947_4^{18}	
1960	$LaCl_3.7H_2O$	371.392		d. 91		
1961	$La(BrO_3)_3.2H_2O$	558.689		d. 15_0		
1962	$La(BrO_3)_3.9H_2O$	684.797		$37._5$		
1963	LaS_2	203.040		d. 65_0		
1964	La_2S_3	374.015			4.91_1^{11}	
1965	$La_2(SO_4)_3$	566.015			3.60_0	
1966	$La_2(SO_4)_3.9H_2O$	728.154			2.82_1	
1967	$(NH_4)_2La_2(SO_4)_4.8H_2O$	812.281	M.		2.51_6	
1968	$La_2O_3.5P_2O_5$	1036.06	M.		3.241	
1969	LaC_2	162.910			$5._{02}$	
1970	$La(C_2H_5SO_4)_6.18H_2O$	1213.81	H.		1.845_4^{25}	224
1971	$Tl_2La(NO_3)_5.4H_2O$	929.812		72 d.	3.318_4^0	
1972	$Zn_3La_2(NO_3)_{12}.24H_2O$	1650.43		$98._0$	2.161_4^0	
1973	$La_2Pt_3(CN)_{12}.18H_2O$	1499.88	M.		2.626	
1974	$Mn_3La_2(NO_3)_{12}.24H_2O$	1619.08		$87._2$	2.080_4^0	
1975	$Co_3La_2(NO_3)_{12}.24H_2O$	1631.20		$101._8$	2.131_4^0	
1976	$Ni_3La_2(NO_3)_{12}.24H_2O$	1630.36		$110._5$	2.146_4^0	
1976.1	$La_2(MoO_4)_3$	757.820	Tet.	1181	4.77^{16}	
1977	CeO_2	172.250	C.	195_0	7.3	
1978	CeF_3—Fluocerite	197.250	H	1324	$5._8$	298
1979	$CeCl_3$	246.624		84_8	3.92_4^0	
1980	$Ce(BrO_3)_3.9H_2O$	686.137	H	49		
1981	Ce_2S_3	376.695			5.02_0^{11}	
1982	$Ce_2(SO_4)_3$	568.695			3.91_2	
1983	$Ce_2(SO_4)_3.5H_2O$	658.772	M.		3.17	
1984	$Ce_2(SO_4)_3.8H_2O$	712.818	Tri.	630	2.886^{17}	
1985	$Ce_2(SO_4)_3.9H_2O$	730.834	H.		2.83_1	
1986	$Ce_2(S_2O_6)_3.15H_2O$	1031.12	Tri.		2.288	560
1987	Ce_2SeO_4	423.700	R.		4.456	748

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
1988	$(NH_4)_2Ce(NO_3)_6.4H_2O$	558.429	M.	74		
1989	$(NH_4)_2SO_4.Ce_2(SO_4)_3.8H_2O$	844.961	M.		2.52_3	
1990	$CePO_4$	235.274			5.2_2	
1991	$Ce(PO_3)_3$	377.322			3.27	
1992	CeC_2	164.250			5.2_3	
1993	$Ce(C_2H_3O_2)_2$	258.296		308 d.		
1994	$CeOF.CO_2$—Bastnäsite	219.250	H		$5._0$	346
1995	$Ce(C_2H_5SO_4)_6.18H_2O$	1215.15	H.		1.930_4^{20}	225
1996	$CeSi_2$	196.370			5.67^{17}	
1997	$Tl_2Ce(NO_3)_6.4H_2O$	931.152		64.5 d.	$3.32_6{}_4^0$	
1998	$Zn_3Ce_2(NO_3)_{12}.24H_2O$	1653.11	Trig	$92._8$	$2.18_8{}_4^0$	
1999	$Ce_2Pt_3(CN)_{12}.18H_2O$	1502.56	M		2.657	
2000	$Mn_3Ce_2(NO_3)_{12}.24H_2O$	1621.76		$83._7$	2.102_4^0	
2001	$Co_3Ce_2(NO_3)_{12}.24H_2O$	1633.88		$98._5$	2.157_4^0	
2002	$Ni_3Ce_2(NO_3)_{12}.24H_2O$	1633.04		$108._5$	2.173_4^0	
2002.1	$Ce_2(MoO_4)_3$	760.480	R. Tet.	973	4.83	416
2003	$Ce_2(WO_4)_3$	1024.50	Tet.	108_9	$6.77^{16.5}$	
2004	$Ce_2O_3.3Al_2O_3.2P_2O_5.6H_2O$—Florencite.	1026.45	Trig		3.59	337
2005	Pr_2O_3	329.840			6.87	
2006	Pr_4O_7	675.680			6.71_5	
2007	$Pr_{10}O_{18}$	1697.20			6.70_4	
2008	$PrCl_3$	247.294		81_8	4.020_4^{25}	
2009	$Pr(BrO_3)_3$	524.668		d. 150		
2010	$Pr(BrO_3)_3.9H_2O$	686.807	H.	56.5		
2011	Pr_2S_3	378.035			5.04_2^{11}	
2012	$Pr_2(SO_4)_3$	570.035			3.72_0^{16}	
2013	$Pr_2(SO_4)_3.5H_2O$	660.112	M.		3.17_3	
2014	$Pr_2(SO_4)_3.8H_2O$	714.158	M.		2.82	663
2015	$Pr_2(SeO_4)_3$	711.440			4.30^{15}	
2016	$Pr_2(SeO_4)_3.8H_2O$	855.563			$3.094^{13.5}$	
2017	PrC_2	164.920			5.1	
2018	$Pr(C_2H_5SO_4)_6.18H_2O$	1215.82	H		1.876_4^{25}	226
2019	$Zn_3Pr_2(NO_3)_{12}.24H_2O$	1654.45	Trig.	91.5	2.202_4^0	
2020	$Mn_3Pr_2(NO_3)_{12}.24H_2O$	1623.10		$81._0$	2.109_4^0	
2021	$Co_3Pr_2(NO_3)_{12}.24H_2O$	1635.22		$97._0$	2.176_4^0	
2022	$Ni_3Pr_2(NO_3)_{12}.24H_2O$	1634.38		$108._0$	2.195_4^0	
2023	Nd_2O_3	336.540			7.24	
2024	$NdCl_3$	250.644		78_4	4.134_4^{25}	
2025	$NdCl_3.6H_2O$	358.736		124	$2.282_4^{16.5}$	
2026	$Nd(BrO_3)_3.2H_2O$	564.049		d. 15_0		
2027	$Nd(BrO_3)_3.9H_2O$	690.157	H	$66._7$		
2028	Nd_2S_3	381.735			5.17_9^{11} ?	
2029	$Nd_2(SO_4)_3.8H_2O$	720.858	M.		2.850	668
2030	NdC_2	168.270			5.1_5	
2031	$Nd(C_2H_5SO_4)_6.18H_2O$	1219.17	H.		1.883_4^{25}	227
2032	$Zn_3Nd_2(NO_3)_{12}.24H_2O$	1661.15		88.5	2.215_4^0	
2033	$Mn_3Nd_2(NO_3)_{12}.24H_2O$	1629.80		$77._0$	2.114_4^0	
2034	$Co_3Nd_2(NO_3)_{12}.24H_2O$	1641.92		$95._5$	2.195_4^0	
2035	$Ni_3Nd_2(NO_3)_{12}.24H_2O$	1641.08		$105._6$	2.202_4^0	
2035.1	$Nd_2(MoO_4)_3$	768.540	Tet.	1176	5.14^{18}	414
2036	$(NdPr)_2(SO_4)_3.8H_2O$		M.			658
2037	Sa_2O_3	348.860			7.43	
2038	$SaCl_2$	221.346			3.69^{22}	
2039	$SaCl_3$	256.804		68_6	4.46_4^{18}	
2040	$SaCl_3.6H_2O$	364.896	Tri.		2.383	
2041	$SaOCl$	201.888			7.02	
2042	$SaBr_3.6H_2O$	498.270			2.971	
2043	$Sa(BrO_3)_3.2H_2O$	570.209		d. 15_0		
2044	$Sa(BrO_3)_3.9H_2O$	696.317	H.	75		
2045	Sa_2S_3	397.055			3.7	
2046	$Sa_2(SO_4)_3.8H_2O$	733.178	M.		2.930	670
2047	$Sa(NO_3)_3.6H_2O$	441.546	Tri.		2.375	
2048	$SaPO_4$	245.454			$5.83^{17.5}$	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2049	SaC_2	174 430			5.8$_6$	
2050	$Sa(CHO_2)_3$	285 453			3.733	
2051	$Sa(C_2H_3O_2)_3.4H_2O$	399 561			1 94	
2052	$Sa(C_3H_5O_2)_3$	369 546			1.894	
2053	$Sa(C_3H_5O_2)_3.3H_2O$	423 592			1.786	
2054	$Sa(C_2H_5SO_4)_6\ 18H_2O$	1225 33	H.		1 904$_4^{25}$	234
2055	$Zn_3Sa_2(NO_3)_{12}\ 24H_2O$	1673 47		76 $_5$	2 283$_4^0$	
2056	$Mn_3Sa_2(NO_3)_{12}\ 24H_2O$	1642 12		70 $_2$	2 188$_4^0$	
2057	$Co_3Sa_2(NO_3)_{12}\ 24H_2O$	1654 24		83 $_2$	2 237$_4^0$	
2058	$Ni_3Sa_2(NO_3)_{12}\ 24H_2O$	1653 40		92 $_2$	2 272$_4^0$	
2059	$Sa_2O\ B_2O_3$	386 500			6 05	
2060	Eu_2O_3	352 000			7 42	
2061	$Eu(C_2H_5SO_4)_6\ 18H_2O$	1226 90	H.		1 909$_4^{25}$	239
2062	Gd_2O_3	362 520			7 40$_7$	
2063	$GdCl_3$	263 634		62$_8$	4 52$_4^0$	
2064	$GdCl_3\ 6H_2O$	371 726			2 424$_4^0$	
2065	$GdBr_3.6H_2O$	505 100			2 84$_4^{15}$	
2066	$Gd_2(SO_4)_3$	602 715			4 13$_9^{14\ 6}$	
2067	$Gd_2(SO_4)_3\ 8H_2O$	746 838	M		3 01$_0^{14\ 6}$	
2068	$Gd(NO_3)_3\ 5H_2O$	433 361		92	2 40$_6^{15}$	
2069	$Gd(NO_3)_3\ 6H_2O$	451 376	Tri	91	2 332	
2070	$Gd_2(C_2O_4)_3.10H_2O$	758 674		110		
2071	$Gd(C_2H_3O_2)_3\ 4H_2O$	406 391	Tri		1 611	
2072	$Gd(C_2H_5SO_4)_6\ 18H_2O$	1232 16	H.		1 919$_4^{25}$	235
2073	$Zn_3Gd_2(NO_3)_{12}\ 24H_2O$	1687 13		56 $_5$	2 351$_4^0$	
2074	$Gd_2Pt_3(CN)_{12}\ 21H_2O$	1590 63	R		2 563	
2075	$Co_3Gd_2(NO_3)_{12}\ 24H_2O$	1667 90		63 $_2$	2 315$_4^0$	
2076	$Ni_3Gd_2(NO_3)_{12}\ 24H_2O$	1667 06		72 $_5$	2 356$_4^0$	
2077	$TbCl_3$	265 574		58$_8$	4 35$_4^0$	
2078	$Tb(NO_3)_3\ 6H_2O$	453 316	M	89 3		
2079	Dy_2O_3	373 040			7 81	
2080	$DyCl_3$	268 894		68$_0$	3 67$_4^0$	
2081	$Dy(C_2H_5SO_4)_6\ 18H_2O$	1237 42	H.		1 492$_4^{25}$	240
2082	Er_2O_3	383 400			8 64$_0$	
2083	$Er_2(SO_4)_3$	623 595			3 67$_8$	
2084	$Er_2(SO_4)_3.8H_2O$	767 718			3 18$_0$	
2085	$Er(C_2H_3O_2)_3\ 4H_2O$	416 831	Tri.		2 114	
2086	$Er(C_2H_5SO_4)_6\ 18H_2O$	1242 60	H.		1 907$_4^{25}$	233
2087	Yb_2O_3	395 200			9 1$_7$	
2088	$YbCl_3\ 6H_2O$	388 066			2 57$_5$	
2089	$Yb_2(SO_4)_3$	635 395			3 79$_3$	
2090	$Yb_2(SO_4)_3\ 8H_2O$	779 518			3 28$_6$	
2091	$Yb_2(SeO_4)_3$	776 800			4 14$_0$	
2092	$Yb_2(SeO_4)_3\ 8H_2O$	920 923			3 3$_0$	
2093	$Yb(NO_3)_3\ 4H_2O$	431 686			2 68$_2$	
2094	$Yb_2(CO_3)_3\ 4H_2O$	599 262			3 67	
2095	$Yb(C_2O_4)_3$	437 600			2 439	
2096	$Yb(C_2O_4)_3.10H_2O$	617 754			2 644	
2097	$Yb(C_2H_3O_2)_3.4H_2O$	422 731			2 09	
2098	$LuCl_3$	281 374		>916	3.98	
2099	HfO_2	211 000		281$_2$	9 68	
2099 5	$HfOCl_2\ 8H_2O$	410 039				270.5
2099 6	$(NH_4)_3HfF_7$	366 034	C.			70.1
2100	BeO	25 0200	H.	24$_{00}$	3 02$_5$	347
2101	BeF_2	47 0200			1. 2 1^{15}	
2102	$2BeO\ 5BeF_2$	285 140			2 3	
2103	$BeCl_2$	79 9360		44$_0$	1 89$_9{}_4^{25}$	
2104	$BeBr_2$	168 852		49$_0$		
2105	BeI_2	262 884		51$_0$	4 20^{15}	
2106	$BeSO_4$	105 085			2 44$_3$	
2107	$BeSO_4\ 4H_2O$	177 147	Tet.		1 71$_3^{10\ 5}$	219
2108	$BeSeO_4\ 4H_2O$	224 282	R.		2.03	537
2109	Be_3N_2	55 0760		22$_{00}$		

Index No.	Formula	Mol. wt	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2110	$Be(NO_3)_2.3H_2O$	187 082		60		
2111	Be_2C	30 0400			1 9^{15}	
2112	$Be(C_2H_5)_2$	67 0970				
2113	$Be(C_3H_7)_2$	95 1278				
2114	$Be(C_5H_7O_2)_2$—Acetylacetonate	207 128	M	108	1 168^{4}	
2115	$BeO.3Be(C_2H_3O_2)_2$	170 126		284	1 36^{4}	
2116	$BeO.3Be(C_2H_3O_2)(C_3H_5O_2)$	448 265		127		
2117	$BeO.3Be(C_3H_5O_2)_2$	490 311		120		
2118	$BeO.3Be(C_4H_7O_2)_2$	574 403				
2119	$BeO.Be(C_2H_5SO_4)_2.4H_2O$	356 309	Tet			220
2120	$BeO.SiO_2$	85 0800		>1755		
2121	$2BeO.SiO_2$—Phenacite	110 100	Tri.		3 0	326
2122	$4BeO.2SiO_2.H_2O$—Bertrandite	238 215	R.		2 6	764
2123	$BeOH.BeBO_2$—Hambergite	93 8677	R.		2 35	733
2124	$BeO.Al_2O_3$—Chrysoberyl	126 940	R.		3 76	933
2125	$3BeO.Al_2O_3.6SiO_2$—Beryl	537 340	H.	1410	2 66	284
2126	$2BeO.Al_2O_3.2SiO_2.H_2O$—Euclase	290 095	M		3 1	839
2127	$2BeO.Yt_2O_3.FeO.2SiO_2$ Gadolinite	468 000	M.		4 3	947
2128	MgO—Periclase	40 3200	C.	2800	3 65	158
2129	$MgO.H_2O$—Brucite	58 3354	Trig		2.4	272
2130	MgF_2—Sellaite	62 3200	Tet	1396	3.0	208
2131	$MgCl_2$—Chloromagnesite	95 2360	H	712	2 325	335
2132	$MgCl_2.6H_2O$—Bischofite	203 328	M.	118 d	1 56	562
2133	$Mg(ClO_3)_2.6H_2O$	299 328		35	1 80	
2134	$Mg(ClO_4)_2$	223 236		d. 251	2 60$_4^{20}$	
2135	$Mg(ClO_4)_2.6H_2O$	331 328		147	1 970$_4^{25}$	
2136	$MgBr_2$	184 152		700	3 72	
2137	$Mg(BrO_3)_2.6H_2O$	388 244	C			117
2138	MgI_2	278 184			4 25	
2139	$Mg(IO_4)_2.4H_2O$	446 246	M.		3 3$^{13.6}$	
2140	MgS	56 3850			2 80	
2141	$MgSO_4$	120 385		1185	2 66	
2142	$MgO.SO_3.H_2O$—Kieserite	138 400	M.		2 57	637
2143	$MgSO_4.5H_2O$	210 462	Tri.		1 718	511
2144	$MgSO_4.6H_2O$—Hexahydrite	228 477	M.		1 76	
2145	$MgO.SO_3.7H_2O$—Epsomite	246 493	R.		1 68	447
2146	$MgS_2O_6.6H_2O$	292 542	Tri.		1 666	
2147	$MgSeO_4.6H_2O$	275 612	M.		1 928	503
2148	$MgO.N_2O_5.H_2O$—Nitromagnesite	166 351				558
2149	$Mg(NO_3)_2.6H_2O$	256 428		95	1 464	
2150	$(NH_4)_2O.MgO.2SO_3.6H_2O$—Boussingaultite	360 620	M.	>120	1 70	464
2151	$(NH_4)_2O.MgO.2SeO_3.6H_2O$	454 890	M.		2 04	568
2152	$Mg_2P_2O_7$	222 688			2 598^{22}	761
2153	$2MgO.P_2O_5.7H_2O$—Newberyite	348 796	R.		2 10	585
2154	$3MgO.P_2O_5.8H_2O$—Bobierite	407 131	M.		2 41	595
2155	$Mg(H_2PO_2)_2.6H_2O$	262 491	Tet		1 59^{15}	
2156	$3MgO.P_2O_5.MgF_2$—Wagnerite	325 328	M.		3 12	701
2157	$(NH_4)_2O.2MgO.P_2O_5.12H_2O$—Struvite	490 950	R.		1 72	522
2158	$3MgO.(NH_4)_2O.2P_2O_5.10H_2O$—Hannayite	637 288	Tri		1 89	703
2159	$3MgO.As_2O_5.8H_2O$—Hoernesite	495 003	M.		2 60	702
2160	$(NH_4)MgAsO_4.6H_2O$	289 111			1 932^{15}	
2161	Mg_3Sb_2	316 500		961		
2162	Mg_3Bi_2	490 960		715		
2163	$MgO.CO_2$—Magnesite	84 3200	Trig		3 037	342
2164	$MgO.CO_2.3H_2O$—Nesquehonite	138 366	R		1 850	542
2165	$MgO.CO_2.5H_2O$—Lansfordite	174 397	M		1 73	459
2166	$2MgO.CO_2.4H_2O$—Artinite	196 702	R.		2 02	630
2167	$4MgO.3CO_2.4H_2O$—Hydromagnesite	365 312	R		2 16	622
2168	$Mg(d\text{-}C_4H_4O_6).5H_2O$	262 428	M.		1 67	
2169	$Mg(d\text{-}C_4H_5O_6)_2.4H_2O$	394 459	R.		1 72	
2170	$Mg(C_2H_3O_2)_2$	142 366		323	1 42	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2171	$Mg(C_2H_3O_2)_2.4H_2O$	214.428	M.		1.454	512
2172	$Mg(CH_2SO_3)_2.4H_2O$—Ethane disulfonate	284.542	Tri.		1.727	
2173	$MgC_{10}H_6O_6S_2.6H_2O$—1, 5-Naphthalene disulfonate	418.589	M.		1.64	777
2174	Mg_2Si	76.7000		1102		
2175	$MgO.SiO_2$—Clinoenstatite	100.380	M.	1557 d.	3.28	836
2176	$MgO.SiO_2$—Enstatite	100.380	R.	d.	3.19	832
2177	$2MgO.SiO_2$—Forsterite	140.700	R.	189_0	3.2_6	828
2178	$2MgO.3SiO_2.4H_2O$—Parasepiolite	332.882	R.			557
2179	$3MgO.2SiO_2.2H_2O$—Chrysotile	277.111	R.		2.5	647
2180	$3MgO.3SiO_2.2H_2O$—Antigorite	337.171	R.		2.62	545
2181	$3MgO.4SiO_2.H_2O$—Talc	379.215	M.		2.7_5	728
2182	$MgSiF_6.6H_2O$	274.472	Trig.			204
2183	$2MgO.SiO_2.Mg(F,OH)_2$—Prolectite		M.		3.1	861
2184	$4MgO.2SiO_2.Mg(F, OH)_2$—Chondrodite		M.		3.1_5	781
2185	$6MgO.3SiO_2.Mg(F, OH)_2$—Humite		R.		3.1_5	790
2186	$8MgO.4SiO_2.Mg(F, OH)_2$—Clinohumite		M.		3.1	863
2187	$MgO.TiO_2$—Geikielite	120.220	Trig.		3.98	402
2188	$MgSnCl_6.6H_2O$	463.860	Trig.		2.08	289
2189	$2(MgPb)O.SiO_2.H_2O$—Molybdophyllite		H.		4.7_2	367
2190	$MgCl_2.2CdCl_2.12H_2O$	678.073	R.			629
2191	$MgHg_2I_6.7H_2O$	1313.24			3.8^0	
2192	$MgPtCl_6.6H_2O$	540.390	Trig.		2.437	
2193	$MgPtBr_6.12H_2O$	915.231	Trig.		2.802	
2194	$MgPdCl_6.6H_2O$	451.860	H.		2.12	
2195	$Mg_2MnCl_6.12H_2O$	532.503	H.		1.802	
2196	$MgO.Fe_2O_3$—Magnesioferrite	200.000	C.		4.6	194
2197	$MgO.Fe_2O_3.3SO_3.13H_2O$—Quetenite	674.395	M.		2.12	626
2198	$2MgO.Fe_2O_3.4SO_3.15H_2O$—Botryogenite	830.811	M.		2.1	660
2199	$6MgO.Fe_2O_3.CO_2.12H_2O$—Pyroaurite	661.785	H.		2.07	275
2200	$6MgO.Fe_2O_3.CO_2.12H_2O$—Brugnatellite	661.785	H.		2.07	264
2201	$3(Fe, Mg)O.Fe_2O_3.2SiO_2.3H_2O$—Cronstedtite		Trig. ?		3.34	363
2202	$MgO.CoO_2$	131.290			5.06	
2203	$Mg_2Ni_2O_2.3SiO_2.6H_2O$—Genthite	486.292	R. ?		$2._5$	
2204	$MgCrO_4.7H_2O$	266.438	R.		1.695	665
2205	$MgO.Cr_2O_3$	192.340			4.5_0	
2206	$MgCrO_4.(NH_4)_2CrO_4.6H_2O$	400.510	M		1.84	813
2207	$6MgO.Cr_2O_3.CO_2.12H_2O$—Stichtite	654.125	H.		2.16	265
2208	$MgW_4O_{13}.8H_2O$	1112.44	M.			926
2209	$3MgO.5V_2O_5.28H_2O$	3407.09	Tri.		2.1_{80}	
2210	$4MgO.Cb_2O_5$	427.480	H		4.4	
2211	$MgO.B_2O_3.3H_2O$—Pinnoite	164.008	Tet.		2.30	277
2212	$2MgO.B_2O_3.H_2O$—Ascharite	168.295			2.7	666
2213	$2MgO.B_2O_3.H_2O$—Camsellite	168.295	R. ?			1041
2214	$3MgO.B_2O_3$	190.600	R.		2.99	833
2215	$6MgO.8B_2O_3.MgCl_2$—Boracite impure	894.276	R. C.	Tr. 265 R. to C.	2.9	856
2216	$10MgO.4B_2O_3.3H_2O$—Szaibelyite	735.806			3	321
2217	$6MgO.2B_2O_3.2SO_3.9H_2O$—Sulfoborite	703.469	R.		2.4	650
2218	$3MgO.B_2O_3.P_2O_5.8H_2O$—Lueneburgite	476.771	M		2.1	649
2219	$3MgO.B_2O_3.MnO.Mn_2O_3$—Pinakiolite	419.390	R.		3.9	999
2220	$3MgO.B_2O_3.FeO.Fe_2O_3$—Ludwigite	422.120	R.		4.0	972
2221	$4MgO.B_2O_3.Fe_2O_3$—Magnesioludwigite	390.600	R		4.0	971
2222	$MgO.Al_2O_3$—Spinel	142.240	C	213_5	3.6	156
2223	$MgO.Al_2O_3.4SO_3.22H_2O$—Pickeringite	858.839	M.		1.85	473
2224	$6MgO.Al_2O_3.CO_2.12H_2O$—Hydrotalcite	604.025	H.		2.06	247
2225	$3MgO.Al_2O_3.3SiO_2$—Pyrope	403.060	C.		3.5	154
2226	$4MgO.Al_2O_3.2SiO_2.5H_2O$—Coleraınite	473.397	H.		2.51	273
2227	$5MgO.Al_2O_3.3SiO_2.4H_2O$—Leuchtenbergite	555.762	M.		2.7	726
2228	$5MgO.Al_2O_3.6SiO_2.4H_2O$—Zebedassite	735.942			2.19	590
2229	$5MgO.6Al_2O_3.2SiO_2$—Sapphirine	933.240	M.		3.45	900
2230	$(FeMg)O.Al_2O_3.P_2O_5.H_2O$—Lazulite		M.		3.1	804

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2231	$Mg_3Gd_2(NO_3)_{12}.24H_2O$	1563.95	Trig.	77.5	2.163_4^0	
2232	CaO—Lime	56.0700	C.	257_2	3.40	168
2233	CaH_2	42.0854		d. 675	1.7	
2234	$Ca(OH)_2$	74.0854	R. Trig.		2.343	318
2235	CaF_2—Fluorite	78.0700	C.	1360	3.180	71
2236	$CaCl_2$—Hydrophyllite	110.986	C.	772	$2.15_2{}_4^{25}$ fused	120
2237	$CaCl_2.6H_2O$	219.078	Trig.	29.92	1.68^{17}	212
2238	$CaF_2.CaCl_2$	189.056		d. 737	3.07	
2239	$CaBr_2$	199.902		765	3.353_4^{25}	
2240	$CaBr_2.3H_2O$	253.948	R	80_5		
2241	$CaBr_2.6H_2O$	307.994	H	38.2		
2242	$Ca(BrO_3)_2.H_2O$	313.917	M	d.	3.329	
2243	$CaF_2.CaBr_2$	277.972			3.15^{18}	
2244	CaI_2	293.934		575	3.956_4^{25}	
2245	$CaI_2.6H_2O$	402.026		42		
2246	$Ca(IO_3)_2$—Lautarite	389.934	Tri.		4.591^{15}	
2247	CaS—Oldhamite	72.1350	C		2.8^{15}	
2248	$CaSO_4$—Anhydrite	136.135	R. M.	Tr. 1193 (R. to M.) M. 1450	2.9_6	708
2249	$CaSO_4.2H_2O$—Gypsum	172.166	M		2.32	600
2250	$CaS_2O_6.4H_2O$	272.262	Trig.		2.176	269
2251	$CaSeO_4$	183.270			2.93	
2252	$CaSeO_4.2H_2O$	219.301	M.		2.676	
2253	Ca_3N_2	148.226		900	2.63^{17}	
2254	$Ca(NO)_2$	100.086			2.53_4^{20}	
2255	$Ca(NO_2)_2.H_2O$	150.101	H.		2.23^{34}	
2256	$Ca(NO_2)_2.4H_2O$	204.148			1.674_0^0	
2257	$Ca(NO_3)_2$—Nitrocalcite	164.086	C.	56_1	$2._{36}$	
2258	$Ca(NO_3)_2.3H_2O$	218.132		51.1		
2259	$Ca(NO_3)_2.4H_2O$ (α)	236.148	M.	42.7	1.8_2	526
2260	$Ca(NO_3)_2.4H_2O$ (β)	236.148		39.7		
2261	Ca_3P_2	182.258		>1600	2.51^{15}	
2262	CaP_2O_6	198.118		97_5	2.82	
2263	$Ca_2P_2O_7$	254.188		1230	3.09	
2264	$2CaO.P_2O_5.H_2O$—Monetite	272.204	Tri.	d.	2.75	586
2265	$2CaO.P_2O_5.5H_2O$—Brushite	344.265	M.		2.25	656
2266	$Ca_3(PO_4)_2$	310.258		1670	3.14	
2267	$Ca_4P_2O_9$	366.328	M.	1630	3.06	148
2268	$4CaO.P_2O_5.5H_2O$—Isoclasite	456.405	M.		2.92	698
2269	$5CaO.2P_2O_5.1.5H_2O$—Martinite	591.469	M. ?		2.89	765
2270	$10CaO.3P_2O_5$	986.844		1540	2.89	
2271	$Ca(H_2PO_4)_2$	234.149	Tri.	d.	2.546_4^{15} *	
2272	$Ca(H_2PO_4)_2.H_2O$	252.164	Tri.	d.	2.220_4^{16}	
2273	$CaF_2.3Ca_3P_2O_8$—Fluoroapatite	1008.84	H.	1630	3.18^{25}	309
2274	$Ca_5P_3ClO_{12}$—Chloroapatite	520.880		1530	3.17^{20}	331
2275	$3Ca_3(PO_4)_2.CaFCl$—Apatite	1025.30		127_0	3.14	308
2276	$(NH_4)CaPO_4.7H_2O$	279.241	M.	d.	1.561^{15}	
2277	Ca_3As_2	270.130			2.5^{15}	
2278	$2CaO.As_2O_5.3H_2O$—Haidingerite	396.106	R.		2.967	756
2279	$2CaO.As_2O_5.5H_2O$—Pharmacolite	432.137	M.		2.535	730
2280	$2CaO.As_2O_5.8H_2O$—Wapplerite	486.183	Tri.		2.48	621
2281	$9CaO.3As_2O_5.CaF_2$—Svabite	1272.46	H.		3.8_0	345
2282	$5CaO.3Sb_2S_5$—Romeite	1491.95	C.		5.04	169
2283	CaC_2	64.0700		23_{00}	2.22	
2284	$CaCO_3$—Aragonite	100.070	R.		2.9_3	880
2285	$CaCO_3$—Calcite	100.070	H.	$1339^{7.9\,000mm}$	$2.711_4^{25.2}$	328
2286	$CaCO_3.6H_2O$	208.162	M.			633
2287	CaC_2O_4	128.070			2.2^4	
2288	$CaO.C_2O_3.H_2O$—Whewellite	146.085	M.		2.23	674
2289	$Ca(CHO_2)_2$	130.085	R.	d.	2.015	577
2290	$CaC_4H_2O_4.H_2O$—Maleate	172.101	R.			706
2291	$CaC_4H_2O_4.2H_2O$—Fumarate	190.116	R.			754

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No
2292	$CaC_4H_4O_5.3H_2O$—Malate	194.147	R.			676
2293	$CaC_4H_4O_4.3H_2O$—Succinate	210.147				648
2294	Ca(*meso*-$C_4H_4O_6$).$3H_2O$.	242.147	Tri.			609
2295	Ca(*d*-$C_4H_4O_6$).$4H_2O$?	260.162	R.			638
2296	$Ca(C_2H_3O_2)_2$	158.116				683
2297	$Ca(C_3H_5O_3)_2.3H_2O$—Lactate	218.147		100		
2298	$Ca(C_4H_5O_2)_2$—Crotonate	210.147				695
2299	$CaC_8H_{10}O_{10}.6H_2O$—Acid malate	414.239	R.			561
2300	$Ca(C_6H_5CO_2)_2.3H_2O$	336.193	R.		1.436	
2301	$CaH_2(C_4H_4O_6)_2.2C_4H_6O_6$— *d*-Tetratartrate	638.239	R.		1.851^{19}	
2302	$Ca_3C_{12}H_6O_{12}$—Aconitate	462.256				636
2303	$Ca_3C_{12}H_{10}O_{14}.2H_2O$—Citrate	534.318		130		
2304	$Ca_3C_{12}H_{10}O_{14}.4H_2O$—Citrate	570.349				618
2305	$Ca(C_4H_2O_3NO_2)_2.xH_2O$—Nitrotetronate		M.		1.745	822
2306	$Ca(C_9H_8NO_3)_2.3H_2O$—Hippurate	450.255	R ?		1.318	
2307	$7CaO.CO_2.2P_2O_5$—Dahllite	720.586	H.		3.08	310
2308	$10CaO.CO_2.3P_2O_5$—Podolite	1030.84	H.		3.077	807
2309	$10CaO.CaF_2.CO_2.3P_2O_5.H_2O$—Francolite	1126.92	H.		3.1	304
2310	$CaSi$	68.1300			2.35^{16}	
2311	$CaSi_2$	96.1900			2.5	
2312	Ca_3Si_2	176.330			1.64	
2313	Ca_6Si_{10}	521.020		1200		
2314	$CaSiO_3$	116.130	H.		2.89	299
2315	$CaO.SiO_2$—Pseudowollastonite	116.130	M.	1540		773
2316	$CaO.SiO_2$—Wollastonite	116.130	M.	Tr. 1200	2.9	800
2317	$CaO.2SiO_2.H_2O$—Okenite	194.205	R.		2.3	578
2318	$2CaO.SiO_2$ (α)	172.200	M. Tri.	2130		908
2319	$2CaO.SiO_2$ (β)	172.200	M. R	Tr. 1420 β to α		1049
2320	$2CaO.SiO_2$ (γ)	172.200	M	Tr. 675 γ to β		824
2321	$2CaO.SiO_2.H_2O$—Hillebrandite	190.215	R. ?		2.69	772
2322	$2CaO.2SiO_2.3H_2O$—Riversideite	286.306			2.61	751
2323	$3CaO.2SiO_2$	288.330	R.	1475 d.		1046
2324	$4CaO.4SiO_2.7H_2O$—Crestmoreite	590.628			2.22	759
2325	$CaSiF_6.2H_2O$	218.161	Tet.		2.25	
2326	$3CaO.CaF_2.3SiO_2.2H_2O$—Zeophyllite	462.191	Trig		2.76	276
2327	$3CaO.CaF.2SiO_2.H_2O$—Custerite	365.415	M.		2.96	732
2328	$5CaO.SiO_2.P_2O_5$	482.158		1760	3.01	
2329	$3CaO.SiO_2.CO_2.SO_3.15H_2O$—Thaumasite	622.566	H.		1.87	243
2330	$5CaO.2SiO_2.CO_2$—Spurrite	444.470	M. ?		3.01	867
2331	$CaO.TiO_2$—Perovskite	135.970	R.		4.10	1025
2332	$CaTi(SO_4)_3$	376.165	C.			91
2333	$5CaO.2TiO_2.3Sb_2O_5$—Lewisite	1410.77	C.		4.95	184
2334	$CaO.TiO_2.SiO_2$—Titanite	196.030	M.	1142	3.5	983
2335	$CaO.SnO_2.3SiO_2.2H_2O$—Stokesite	422.981	R.		3.2	776
2336	$Ca_2PbC_{18}H_{30}O_{12}$—Propionate	725.571	Tet.			251
2337	$2CaO.PbO.3SiO_2$	515.520			3.99	955
2338	$4CaO.6PbO.6SiO_2.H_2O$—Ganomalite	1902.86	Tet.		5.74	985
2339	$4CaO.5PbO.PbCl_2.6SiO_2$—Nasonite	1978.76	H.		5.7	380, 384
2340	$CaO.ZnO.SiO_2.H_2O$—Clinohedrite	215.525	M.		3.33	862
2341	$2CaO.ZnO.SiO_2$—Hardystonite	253.580	Tet.		3.4	332
2342	$CaHgI_4$	748.108			3.30^0	
2343	$CaHg_5I_{12}.8H_2O$	2710.43			4.69^0	
2344	$Ca_3Hg_4I_{14}.24H_2O$	3132.07			3.61^0	
2345	$CaSO_4.3Cu(OH)_2.CuSO_4.3H_2O$— Urvolgyite	574.542	R.		3.132	
2346	$2CaO.2CuO.As_2O_5.H_2O$—Higginsite	519.215	R.		4.33	965
2347	$CaCu(C_2H_3O_2)_4.6H_2O$.	357.748	Tet.		1.42	213
2348	$CaPt(CN)_4.5H_2O$	429.409	R.			1045
2349	$2CaO.MnO.P_2O_5.2H_2O$—Fairfieldite	361.149	Tri.		3.07	823
2350	$2CaO.MnO.As_2O_5.2H_2O$—Brandtite.	419.021	Tri.		3.671	902
2351	$CaO.MnO.SiO_2$—Glaucochroite.	187.060	R.		3.41	910

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2352	$4CaO.2Mn_2O_3.5SiO_2.4H_2O$—Orientite.	912.362	R.		3.1	943
2353	$4CaSiO_3.3MnSiO_3$—Bustamite	857.490	Tri.			868
2354	$CaO.Fe_2O_3$	215.750		1216 d.		408
2355	$2CaO.Fe_2O_3$	271.820		1436 d		1057
2356	$2CaO.FeO.P_2O_5.4H_2O$—Anapaite	398.090	Tri.		2.8$_2$	778
2357	$6CaO.3Fe_2O_3.4P_2O_5.19H_2O$—Calcioferrite	1725.94	M.		2.53	282
2358	$3CaO.2Fe_2O_3.2As_2O_5.6H_2O$—Arseniosiderite	1055.50	R.		3.36	376
2359	$FeCa_2(CN)_6.12H_2O$	508.212	Tri.			718
2360	$CaO.FeO.2SiO_2$—Hedenbergite	248.030	M.	1100	3.7	922
2361	$2CaO.4FeO.Fe_2O_3.4SiO_2.H_2O$—Ilvaite.	817.435	R.		4.0	984
2362	$CaO.Cr_2O_3$	208.090			4.8^{18}	
2363	$15CaO.8CrO_3.7I_2O_5$—Dietzeite	397.818	M.		3.70	970
2364	$3CaO.Cr_2O_3.3SiO_2$—Uvarovite	500.110	C.		3.42	170
2365	$CaMoO_4$—Powellite	200.070	Tet.		4.35	388
2366	$CaO.WO_3$—Scheelite	288.070	Tet.		6.06	381
2367	$CaO.8UO_3.2SO_3.25H_2O$—Uranopilite	2505.56	Tri. ?		3.8	788
2368	$CaO.2UO_3.P_2O_5.8H_2O$—Autunite	914.581	R.		3.1	707
2369	$CaO.2UO_3.P_2O_5.8H_2O$—Bassetite	914.581	M.		3.10	705
2370	$CaO.2UO_3.As_2O_5.8H_2O$—Uranospinite.	1002.45	R.		3.45	719
2371	$2CaO.UO_2.4CO_2.10H_2O$—Uranothallite.	738.464	R.		2.8	547
2372	$CaO.2UO_3.2SiO_2.6H_2O$—Uranophane	856.622	Tri. ?		3.9	855
2373	CaV_4O_{11}	419.910		637		
2374	$CaO.3V_2O_5.9H_2O$—Hewettite	763.969	R.		2.554	1011
2375	$CaO.3V_2O_5.9H_2O$—Metahewettite	763.969	R.		2.51	1003
2376	$2CaO.3V_2O_5.11H_2O$—Pascoite	856.069	M.		2.46	961
2377	$CaCl_2.Ca_3(VO_4)_2$.	461.116	R.		4.01	
2378	CaB_6	104.990			2.3	
2379	$CaO.B_2O_3$	125.710	R.	1100		841
2380	$2CaO.B_2O_3$	181.780		1304		
2381	$2CaO.3B_2O_3.5H_2O$—Colemanite	411.137	M.	d.	2.43	739
2382	$2CaO.3B_2O_3.7H_2O$—Meyerhofferite	447.168	Tri.	d.	2.12	635
2383	$2CaO.3B_2O_3.13H_2O$—Inyoite	555.260	M.	d.	1.875	570
2384	$4CaO.5B_2O_3.9H_2O$—Pandermite	731.619	M.	d.	2.43	738
2385	$5CaO.6B_2O_3.9H_2O$—Priceite	860.329	Tri.		2.4	735
2386	$CaO.2SiO_2.B_2O_3$—Danburite	245.830	R.		3.0	806
2387	$2CaO.2SiO_2.B_2O_3.H_2O$—Datolite	319.915			3.0	831
2388	$4CaO.5B_2O_3.2SiO_2.5H_2O$—Howlite	782.677	M.		2.6	746
2389	$8CaO.5B_2O_3.6SiO_2.6H_2O$—Bakerite	1265.21			2.8	721
2390	$CaO.B_2O_3.SnO_2$—Nordenskioeldine	276.410	Trig.		4.2	
2391	$CaO.Al_2O_3$	157.990	M. ?, Tri.	1600		838
2392	$3CaO.Al_2O_3$.	270.130	C.	1535 d		155
2393	$3CaO.5Al_2O_3$	677.810	Tet. ?, R.	1720		300
2394	$5CaO.3Al_2O_3$	586.110	C.	1455		141
2395	$CaF_2.Al(F, OH)_3.H_2O$—Gearksutite		M.		2.77	445
2396	$CaF_2.2Al(F, OH)_3.H_2O$—Prosopite		M. Tri.		2.88	548
2397	$6CaO.Al_2O_3.3SO_3.33H_2O$—Ettringite	1273.04	H.		1.75	231
2398	$CaO.2CaF_2.2Al(F, OH)_3.SO_3.2H_2O$—Creedite		M.		2.73	470
2399	$CaO.2Al_2O_3.P_2O_5.5H_2O$—Crandallite	492.035	R.		3.5	294
2400	$CaO.Al_2O_3.2SiO_2$—Anorthite	278.110	Tri.	1551	2.765	723
2401	$CaO.Al_2O_3.2SiO_2.2H_2O$—Hibschite.	314.141	C.		3.05	149
2402	$CaO.Al_2O_3.2SiO_2.2H_2O$—Lawsonite.	314.141	R.		3.09	809
2403	$CaO.Al_2O_3.3SiO_2.5H_2O$—Levynite	428.247	Trig.		2.1	241
2404	$CaO.Al_2O_3.4SiO_2.4H_2O$—Gismondite	470.292		1550	2.3	644
2405	$CaO.Al_2O_3.4SiO_2.4H_2O$—Laumontite	470.292	M.		2.3	605
2406	$CaO.Al_2O_3.6SiO_2.5H_2O$—Epistilbite	608.427	M.		2.25	572
2407	$CaO.Al_2O_3.6SiO_2.5H_2O$—Heulandite.	608.427	M.		2.2	528
2408	$CaO.Al_2O_3.7SiO_2.7H_2O$—Stellerite	704.518	R.		2.1$_2$	509
2409	$CaO.2Al_2O_3.2SiO_2.H_2O$—Margarite	398.045	M.		3.0	820
2410	$2CaO.Al_2O_3.SiO_2$—Velardenite.	274.120	Tet.	1590	3.04	333
2411	$2CaO.Al_2O_3.3SiO_2.H_2O$—Prehnite	412.255	R.		2.9	796
2412	$2CaO.Al_2O_3.5SiO_2.6H_2O$—Laubanite	622.452	M. ?		2.2	221

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2413	$2CaO.3Al_2O_3.9SiO_2$—Didymolite	958.440	M.		2.71	540
2414	$3CaO.Al_2O_3.SiO_2$	330.190	R.			1048
2415	$3CaO.Al_2O_3.3SiO_2$—Grossularite	450.310	C.		3.530	157
2416	$3CaO.Al_2O_3.6SiO_2.H_2O$—Bavenite	648.505	M.		2.72	717
2417	$4CaO.3Al_2O_3.6SiO_2$—Meionite	890.400	Tet.		2.74	295
2417.1	$4CaO.3Al_2O_3.6SiO_2.H_2O$—Clinozoisite	908.415	M.		3.36	915
2418	$4CaO.3Al_2O_3.6SiO_2.H_2O$—Zoisite	908.415	R.		3.3	896
2419	$3CaO.5Ce_2O_3.6P_2O_5.24H_2O$—Churchite	3095.37	M.		3.14	785
2420	$CaO.2CeOF.3CO_2$—Parisite	538.570	Trig.		4.32	279
2421	$CaPO_4.BeOH$—Hydro-herderite	161.122	R.		3.0_0	774
2422	$CaCl_2.2MgCl_2.12H_2O$—Tachyhydrite	517.643	H.	>168 d.	1.66_5	249
2423	$2CaO.2MgO.As_2O_5.H_2O$—Adelite	440.715	M.		3.76	909
2424	$2CaO.MgO.As_2O_5.MgF$—Tilasite	425.700	M.		3.28	847
2425	$CaO.MgO.2CO_2$—Dolomite	184.390	Trig.		2.872	339
2426	$CaO.MgO.SiO_2$—Monticellite	156.450	R.	d. 1498	3.2	852
2427	$CaO.MgO.2SiO_2$—Diopside	216.510	M.	1391	3.3	864
2428	$CaO.3MgO.2SiO_2$—Merwinite	297.150	M.		3.15	901
2429	$CaO.3MgO.4SiO_2$—Tremolite	417.270	M.		3.0	786
2430	$2CaO.MgO.2SiO_2$—Åkermannite	272.580	Tet.	1458	2.944	307
2431	$5CaO.2MgO.6SiO_2$	721.350		d. 1365		797
2432	$CaO.MgO.3B_2O_3.6H_2O$—Hydroboracite	413.402	M.		2.0	631
2433	$CaO.MgO.Al_2O_3.SiO_2$—Gehlenite	258.370	Tet.		3.04	330
2434	SrO	103.620	R.	243_0	4.7	
2435	$Sr(OH)_2$	121.635			3.625	
2436	$Sr(OH)_2.8H_2O$	265.758	Tet.		1.9_0	242
2437	SrF_2	125.620	C.	1190	2.44	
2438	$SrCl_2$	158.536	C.	873	3.052	140
2439	$SrCl_2.6H_2O$	266.628	Trig.	d. 61	1.93	257
2440	$Sr(ClO_3)_2$	254.536	R.	120 d.	3.152	763
2441	$SrF_2.SrCl_2$	284.156	Tet.	962	4.18	324
2442	$SrBr_2$	247.452		643	$4.21_6{}_4^{24}$	
2443	$SrBr_2.6H_2O$	355.544		d. 20	2.358^{18}	
2444	$Sr(BrO_3)_2.H_2O$	361.467	M.	d.	3.773	
2445	$SrBr_2.SrF_2$	373.072			4.06	
2446	SrI_2	341.484		402	$4.54_9{}_4^{25}$	
2447	$Sr(IO_3)_2$	437.484	Tri.		5.045^{15}	
2448	$SrI_2.SrF_2$	467.104			4.5	
2449	SrS	119.685	C.		3.70^{15}	
2450	$SrS_4.6H_2O$	323.972		25		
2451	$SrO.SO_3$—Celestite	183.685	R.	1580 d.	3.96	789
2452	$SrS_2O_3.5H_2O$	289.827	M.	d.	2.17^{17}	
2453	$SrS_2O_6.4H_2O$	319.812	Trig.		2.373	253
2454	$Sr(NO)_2$	147.636			2.683	
2455	$Sr(NO)_2.5H_2O$	237.713			2.173_4^{20}	
2456	$Sr(NO_2)_2$	179.636			2.867^{27}	
2457	$Sr(NO_2)_2.H_2O$	197.651		d.	2.408_0^0	
2458	$Sr(NO_3)_2$	211.636	C.	570	2.986	135
2459	$Sr(NO_3)_2.4H_2O$	283.698	M.		2.2	
2460	Sr_3P_2	324.908			2.68	
2461	$SrHPO_4$	183.652	R.		3.544	
2462	SrC_2	111.620			$3._2$	
2463	$SrO.CO_2$—Strontianite	147.620	R.	$1497^{60\ at}$	3.70	853
2464	$Sr(CHO_2)_2$	177.635	R.	71.9	2.69	704
2465	$Sr(CHO_2)_2.H_2O$	195.651	R.		2.25	
2466	$Sr(CHO_2)_2.2H_2O$	213.666	R.		2.69_5	597
2467	$Sr(C_2H_3O_2)_2$	205.666			2.099	
2468	$Sr(CH_2SO_3)_2.H_2O$ Ethane disulfonate	293.796	M.		2.355 (α) 2.453 (β)	
2469	$Sr(C_2H_5O_4S)_2.2H_2O$—Ethylsulfate	373.858	M.		2.032	554
2470	$Sr(C_4H_2O_3NO_2)_2.xH_2O$—Nitrotetronate		M.		2.043	812
2471	$Sr(SbOC_4H_4O_6)_2$	627.222	H.			426
2472	$SrSiO_3$	163.680		1580	3.65	60
2473	$2SrO.SiO_2$	267.300		>1700	3.84	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2474	$SrSiF_6.2H_2O$	265.711	M.		$2.99^{17.8}$	
2475	$SrCl_2.2CdCl_2.7H_2O$	651.296	M.		2.718^{24}	
2476	$SrHg_6I_{14}.8H_2O$	2757.98			4.06^0	
2477	$Sr_2Cu(CHO_2)_6.8H_2O$	562.964	Tri.			593
2479	$SrCrO_4$	203.630	M.		3.895^{15}	
2480	$SrCr_2O_7.3H_2O$	357.686	M.			905
2481	$Sr(OCrO_2Cl)_2.4H_2O$	430.618		72		
2482	$SrMoO_4$	247.620			4.145	
2483	$SrWO_4$	335.620			6.184	
2484	$Sr_2W_{12}SiO_{40}.16H_2O$	3339.55	M.			934
2485	SrB_6	152.540			3.3	
2486	$SrO.B_2O_3$	173.260		1100		
2487	$SrO.2B_2O_3$	242.900		930		
2488	$2SrO.B_2O_3$	276.880		1130		
2489	$2SrO.3Al_2O_3.2P_2O_5.7H_2O$—Goyazite	923.204	Trig		3.2	305
2490	$2SrO.3Al_2O_3.P_2O_5.2SO_3.6H_2O$—Svanbergite	923.270	Trig		3.5	314
2491	$SrO.Al_2O_3.2SiO_2$	325.660		>1700		
2492	$3SrO.2Ce_2O_3.7CO_2.5H_2O$—Ancylite	1365.94	R.		3.95	974
2493	$SrCa_2C_{18}H_{30}O_{12}$—Propionate	605.991	Tet.			230
2494	BaO	153.370	C.	1923	5.72	
2495	BaO_2	169.370			4.96	
2496	BaH_2	139.385		d. 675	4.21^0	
2497	$Ba(OH)_2$	171.385	M.		4.495	
2498	$Ba(OH)_2.8H_2O$	315.509	M.	77.9	2.18	544
2499	BaF_2	175.370	C.	1280	4.83	
2500	$BaCl_2$	208.286	M. C.	Tr. 925 962	3.856_4^{24}	
2501	$BaCl_2.2H_2O$	244.317	R.		3.097_4^{24}	825
2502	$Ba(ClO)_2$	240.286		d. 235		
2503	$Ba(ClO_2)_2$	304.286		414		
2504	$Ba(ClO_3)_2.H_2O$	322.301	M.	d. 120	3.179	713
2505	$Ba(ClO_4)_2$	336.286		505		
2506	$Ba(ClO_4)_2.3H_2O$	390.332	H.		2.74	
2507	$BaClF$	191.828	Tet.	1008	5.931	315
2508	$BaCl_2.BaF_2$	383.656			4.51^{18}	
2509	$BaBr_2$	297.202		847	4.781_4^{24}	
2510	$BaBr_2.2H_2O$	333.233	M.		3.582_4^{24}	913
2511	$Ba(BrO_3)_2.H_2O$	411.217	M.		3.99^{18}	
2512	$BaBr_2.BaF_2$	472.572			4.96^{18}	
2513	BaI_2	391.234		740 d.	5.151	
2514	$BaI_2.6H_2O$	499.326	H.	25.7		
2515	$BaI_2.7H_2O$	517.342			3.67	
2516	$Ba(IO_3)_2$	487.234	M.		5.23	
2517	$Ba(IO_3)_2.H_2O$	505.249	M.		5.0^{15}	
2518	$BaI_2.BaF_2$	566.604			5.21^{18}	
2519	BaS	169.435	C.		4.25^{15}	
2520	$BaS_4.2H_2O$	301.661	R.	d.	2.988	
2521	$BaO.SO_3$—Barite	233.435	R.	Tr. 1149 to M. ? 1580	4.499^{15}	816
2522	$BaS_2O_3.H_2O$	267.515	R.		3.45^{18}	
2523	$BaS_2O_6.2H_2O$	333.531	R. M.		$4.536^{13.5}$	744
2524	$BaS_2O_6.4H_2O$	369.562	M.		3.142	1076
2525	$BaSeO_4$	280.570	R.	d.	4.75	
2526	$BaTeO_4$	328.870			4.48^{16}	
2527	BaN_6	221.418	R.	d. 219		
2528	$Ba(NO)_2$	197.386			3.891^{23}	
2529	$Ba(NO_2)_2$	229.386		217	3.23^{23}	
2530	$Ba(NO_2)_2.H_2O$	247.401			3.173^{29}	
2531	$Ba(NO_3)_2$—Nitrobarite	261.386	C.	592	3.244^{23}	137
2532	$Ba(NH_2)_2$	169.417		280		
2533	$Ba_2P_2O_7$	448.788	R.		4.1^{16}	
2534	$Ba_3(PO_4)_2$	602.158	C.		4.1^{16}	

Index No.	Formula	Mol. wt	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2535	$BaHPO_4$	233 402	R.		4 165^{15}	
2536	$BaH_4(PO_2)_2.H_2O$	285 464	M.		2 90^{17}	
2537	$BaF_2.3Ba_3P_2O_8$	1981 84	H.	1670		334
2538	$BaCl_2.3Ba_3P_2O_8$	2014 76	H.	1584	5 949	343
2539	Ba_3As_2	562 030			4 1^{15}	
2540	$BaHAsO_4.H_2O$	295 353	R M.		3.93^{15}	
2541	BaC_2	161 370			3.75	
2542	$BaCO_3$ Witherite	197 370	R.	Tr. 811 to α	4.43	875
2543	$BaCO_3$ (α)	197 370	H.	Tr. 982 to β		
2544	$BaCO_3$ (β)	197 370		1740$^{90\ at}$		
2545	BaC_2O_4	225 370			2 658	
2546	$Ba(CHO_2)_2$	227 385	R.		3 21	745
2547	$BaC_3H_2O_4$ Malonate	239 385			2 147$^{18}_{4}$	
2548	$Ba(meso\text{-}C_4H_4O_6).H_2O$	303 416			2 98	
2549	$Ba(dl\text{-}C_4H_4O_6).5H_2O$	375 478	M.			1051
2550	$Ba(C_2H_3O_2)_2$	255 416			2 468	
2551	$Ba(C_2H_3O_2)_2.H_2O$	273 432	Tri.		2 19	582
2552	$Ba(C_2H_3O_2)_2.3H_2O$	309 462	Tri.		2 021	
2553	$Ba(C_2H_5CO_2)_2.H_2O$	301 462	R.			584
2554	$Ba(CH_2SO_3)_2$ Ethane disulfonate	325 531	R.		2 779	
2555	$BaC_6H_4O_7S_2.4H_2O$—Phenol-2, 4-disulfonate	461 592	M.			767
2556	$BaC_{10}H_6O_6S_2.H_2O$—Naphthalene-1, 5-disulfonate	441 562	R.		2 282	904
2557	$BaSiO_3$	213 430		1604	4 399	872
2558	$BaSiO_3.6H_2O$	321 522	R.		2 59	659
2559	$BaO.2SiO_2$	273 490	R.	1420	3.73	775
2560	$2BaO.SiO_2$	366 800		>1755		1052
2561	$2BaO.3SiO_2$	486 920		1450	3 93	795
2562	$BaSiF_6$	279 430			4 279^{15}	
2563	$BaO.TiO_2.3SiO_2$ Benitoite	413 450	H.		3 7	356
2564	$BaCdCl_4.4H_2O$	463 674	Tri.		2 968	827
2565	$BaCdBr_4.4H_2O$	641 506	Tri.		3 687	894
2566	$BaCd(CHO_2)_4.2H_2O$	465 842	M.			627
2567	$BaHg_5I_{12}$	2692 60			4 63^{0}	
2568	$Ba_3Hg_5I_{16}.16H_2O$	3734 32			4 06	
2569	$BaPtBr_6.10H_2O$	992 250	M.		3 713	
2570	$BaPt(CN)_4.4H_2O$	508 694	M.		3 05	1047
2571	$BaO.MnO_2$	240 300			5 85	
2572	$BaO.FeO.4SiO_2$—Gillespite	465 450	Trig.		3 33	302
2573	$4BaO.FeO.2Fe_2O_3.10SiO_2$ Taramellite	1605 28	R.		3 92	942
2574	$BaNi_2O_5$	334 750			4 8	
2575	$BaCrO_4$	253 380			4 498^{15}	
2576	$Ba_3[Cr(C_2O_4)_3]_2$	1044 13			2 57	
2577	$Ba_3[Cr(C_2O_4)_3]_2.7H_2O$	1170 24			2 896^{28}	
2578	$Ba_3[Cr(C_2O_4)_3]_2.12H_2O$	1260 31			2 372^{27}	
2579	$BaMoO_4$	297 370			4 65	
2580	$BaWO_4$	385 370			6 35	
2581	$BaO.4WO_3.9H_2O$	1243 51	R		4 30	
2582	$Ba_2W_{12}SiO_{40}.16H_2O$	3439 05	M			962
2583	$BaO.2UO_3.P_2O_5.8H_2O$—Uranocircite	1011 88	R.		3 53	787
2584	$Ba_2V_2O_7$	488 660		ca. 863		
2585	$3BaO.10WO_3.V_2O_5.SiO_2.28H_2O$	3526 52			3 66	
2586	BaB_6	202 290			4 36	
2587	$BaO.B_2O_3$	223 010		1060		
2588	$2BaO.B_2O_3$	376 380		1002		
2589	$3BaO.B_2O_3$	529 750		1315		
2590	$BaCl_2.2AlCl_3$	474 954		290		
2591	$BaO.Al_2O_3.2SiO_2$—Celsian	375 410	M.	>1700	3 37	727
2592	$BaO.Al_2O_3.3SiO_2.3H_2O$ Edingtonite	435 470	R.		2 7	662
2593	$4BaO.Al_2O_3.7SiO_2$—Barylite	1135 82	R.		4 03	884
2594	$BaF_2.Ce_2O_3.3CO_2$—Cordylite	635 870	H.		4 31	357
2595	$BaO.CaO.2CO_2$—Barytocalcite	297 440	M.		3 65	828

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2596	$BaCa_2C_{18}H_{30}O_{12}$—Propionate	655.741	C.			73
2597	$BaO.2CaO.3SiO_2$	445.690	H. ?	1320 d.		338
2598	$RaCl_2$	296.866	M.	1000 Tr. 870	4.91	
2599	$RaBr_2$	385.782	M.	728	5.79	
2600	Li_2O	29.8780		>1700	2.013_4^{25}	
2601	LiH	7.94670	C.	680	0.820	
2602	$LiOH$	23.9467		450	2.54	
2603	$LiOH.H_2O$	41.9621			1.83	
2604	LiF	25.9390	C	870	$2.295^{21.5}$ l. 1.789^{870}	
2605	$LiCl$	42.3970	C.	613	2.068_4^{25}	
2606	$LiClO_3$	90.3970		129		
2607	$LiClO_3.0.5H_2O$	99.4047		65		
2608	$LiClO_4$	106.397		236	2.429	
2609	$LiClO_4.3H_2O$	160.443	H.	95	1.841	
2610	$LiBr$	86.8550	C.	547	3.464_4^{25}	
2611	$LiBr.2H_2O$	122.886		44		
2612	$LiBr.3H_2O$	140.901		3.5		
2613	LiI	133.871		446	4.061_4^{25} l $2.827^{673.4}$	
2614	$LiI.3H_2O$	187.917		73		
2615	Li_2S	45.9430			1.66	
2616	Li_2SO_4	109.943	M.	860	2.221 l. 2.001^{860}	455
2617	$Li_2SO_4.H_2O$	127.958	M		2.06	469
2618	$Li_2S_2O_6.2H_2O$	210.039	R		2.158	684
2619	$LiHSO_4$	104.012			2.123^{13}	
2620	$LiNO_2.H_2O$	70.9624			1.615^{0}	
2621	$LiNO_3$	68.9470	Trig.	255	l. 1.777_4^{272} 2.38	353
2622	$LiNO_3.3H_2O$	122.993		d 29.6		
2623	$LiNH_2$	22.9624		390	$1.178^{17.5}$	
2624	Li_2NH	28.8937			1.303^{19}	
2625	$LiBr.NH_3$	103.886		97		
2626	$LiNH_4SO_4$	121.043	M (α) H (β) M (γ ?)		1.204	
2627	$LiPO_3$	85.963			2.461	
2628	Li_3PO_4	115.841	R	837	$2.537^{17.5}$	
2629	$Li_3PO_4.12H_2O$	332.026	Trig.	100	1.645	
2630	LiH_2PO_4	103.978		>100	2.461	
2631	Li_3AsO_4	159.777			3.07	
2632	Li_3Sb	142.587		>950	3.2^{17}	
2633	Li_2C_2	37.8780			1.65^{18}	
2634	Li_2CO_3	73.8780	M.	618	$2.111^{17.5}$ l. 1.765^{900}	694
2635	$Li_2C_2O_4$	101.878			$2.121^{17.5}$	
2636	$LiCHO_2.H_2O$	69.9621	R.		1.46	
2637	$LiHC_4H_4O_5.6H_2O$—Malate	248.070	M			682
2638	$LiC_2H_3O_2.2H_2O$	101.993	R.	70		533
2639	$Li_2(CH_2SO_3)_2.2H_2O$—Ethane disulfonate	238.070	M.		1.817	
2640	$Li_2C_{10}H_6O_6S_2.2H_2O$—Naphthalene 1, 5-disulfonate	336.085	M.		1.664	814
2641	$LiNH_4(dl\text{-}C_4H_4O_6).H_2O$	191.024	M.			614
2642	$LiNH_4(d\text{-}C_4H_4O_6).H_2O$	191.024	R.			693
2643	Li_6Si_2	97.7540			1.12	
2644	$Li_2O.SiO_2$	89.9380	R.	1201	l. 2.33_4^{25} 2.52_4^{25}	55 322, 1042
2645	$Li_2O.2SiO_2$	149.998		1032 d.	2.454_4^{25}	
2646	$2Li_2O.SiO_2$	119.816		1256	2.28	1043
2647	$Li_2SiF_6.2H_2O$	191.969	M.		2.3	
2648	$TlLi(dl\text{-}C_4H_4O_6).2H_2O$	395.401	Tri.		3.144	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2649	$2LiI.HgI_2.6H_2O$	830.308			3.26^0	
2650	$2LiI.HgI_2.8H_2O$	866.339			2.95^0	
2651	$Li_2O.2MnO.P_2O_5$—Lithiophilite	313.786	R.		3.5	878
2652	$Li_2O.2FeO.P_2O_5$—Triphylite	315.606	R.		3.55	895
2653	$Li(UO_2)(C_2H_3O_2)_3.3H_2O$	508.224	M.		2.280^{15}	
2654	$Li_2O.B_2O_3$	99.5180		843		
2655	$Li_2O.B_2O_3.16H_2O$	387.764	Trig.	47	1.38	
2656	$Li_2O.2B_2O_3$	169.158		900		
2657	$Li_2O.Al_2O_3$	131.798		>1625	$2.554_4^{25.1}$	
2658	$2LiF.Al_2O_3.P_2O_5$—Amblygonite	295.846	Tri.		3.05	740
2659	$Li_2O.Al_2O_3.2SiO_2$—Eucryptite	251.918	H.	1388	2.67	268
2660	$Li_2O.Al_2O_3.4SiO_2$—Spodumene.	372.038	M.	1400	3.2	854
2661	$Li_2O.Al_2O_3.5SiO_2$	432.098			2.40	
2662	$Li_2O.Al_2O_3.6SiO_2$	492.158			2.41	
2663	$Li_2O.Al_2O_3.8SiO_2$—Petalite	612.278	M.	1370	2.4	573
2664	$2Li_2O.7Al_2O_3.2B_2O_3.6SiO_2.12H_2O$—Manandonite.	1489.02	H.		2.89	749
2665	Na_2O	61.9940			2.27	
2666	$Na_2O_2.8H_2O$	222.117	H.	d. 30		
2667	NaH	24.0047			0.92	
2668	$NaOH$	40.0047		318.4	2.130	
2669	$NaOH.3.5H_2O$	103.059		15.5		
2670	NaF—Villiaumite	41.9970	Tet.	980	2.79	66
2671	$NaCl$—Halite	58.4550	C.	804	2.163	129
2672	$NaOCl.2.5H_2O$.	119.494		57.5		
2673	$NaOCl.5H_2O$	164.532		24.5		
2674	$NaClO_3$	106.455	C. Trig.	248	2.490^{15}	110
2675	$NaClO_4$	122.455	R.	482 d.		
2676	$NaClO_4.H_2O$	140.470	H.	d. 130	2.02	
2677	$NaBr$	102.913	C.	755	3.205	
2678	$NaBr.2H_2O$	138.944	M.	50.7	2.176	
2679	$NaBrO_3$	150.913	C.	381	$3.339^{17.5}$	138
2680	NaI	149.929	C.	651	3.667	
2681	$NaIO_3$	197.929	R.	d.	4.277	
2682	$NaIO_4$	213.929	Tet.	d. 300	3.865^{16}	
2683	$NaIO_4.3H_2O$	267.975	Trig.		3.219^{18}	
2684	Na_2S	78.0590			1.856	
2685	Na_2S_2	110.124		445		
2686	Na_2S_3	142.189		223.5		
2687	Na_2S_4	174.254	C.	275		
2688	$Na_2S_4.6H_2O$	282.346		25		
2689	Na_2S_5	206.319		251.8		
2690	$Na_2SO_3.7H_2O$	252.167	M.		1.561	
2691	Na_2SO_4 (α) Thenardite	142.059	R.	Tr. 100	2.69	466
2692	Na_2SO_4	142.059	R. M. H.	Tr. 100 to M. Tr. 500 to H 884	2.698	
2693	$Na_2SO_4.10H_2O$—Glaubers salt	322.213	M.	d. 32.4	1.464	434
2694	$Na_2SO_4.10H_2O$—Mirabilite	322.213	M.		1.48	428
2695	$Na_2S_2O_3$	158.124	M.		1.667	
2696	$Na_2S_2O_3.5H_2O$	248.201	M.	d. 48.0	1.685	564
2697	$Na_2S_2O_6.2H_2O$	242.155	R.		2.189	520
2698	$NaHS.3H_2O$.	110.116	R	22		
2699	$NaHSO_4$	120.070	Tri.	>315	2.742	
2700	$2Na_2O.NaCl.NaF.2SO_3$—Sulphohalite.	384.570	C.		2.49	76
2701	Na_2Se_4	362.794		−55		
2702	Na_2SeO_4.	189.194	R.		3.098	
2703	$Na_2SeO_4.10H_2O$	369.348	M.		1.58	
2704	$NaNO_2$	69.0050	R.	271	2.168^0	
2705	$NaNO_3$—Soda-niter	85.0050	Trig.	308	2.257	288
2706	$Na_2(NO)_2$	106.010		300 d.	2.466^{30}	
2707	$NaNH_2$	39.0204		210		
2708	$3Na_2O.N_2O_5.2SO_3.2H_2O$—Darapskite	490.159	M.		2.2	475

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2709	$6NaNO_3.2Na_2SO_4.3H_2O$—Nitroglauberite	848.194	R.			534
2710	$NaNH_4SO_4.2H_2O$—Lecontite	173.132	R.	d.	1.63	443
2711	$NaPO_3$	102.021		616 d.	2.476	
2712	Na_3PO_4	164.015		1340	$2.537^{17.5}$	
2713	$Na_3PO_4.12H_2O$	380.200	Trig.	d. 73.4	1.62	214
2714	$(NaPO_3)_3.2H_2O$	342.094	Tri.	d.	2.476	
2715	$Na_4P_2O_6.10H_2O$	430.190	M.		1.832	480
2716	$Na_4P_2O_7$	266.036		988	2.45	
2717	$Na_4P_2O_7.10H_2O$	446.190	M.	d.	1.82	444
2718	$NaH_2PO_2.2.5H_2O$	149.075	M.	42		432
2719	$NaH_2PO_4.H_2O$	138.052	R.	d. 190	2.040	487
2720	$NaH_2PO_4.2H_2O$	156.067	R.	*ca.* 60	1.91	450
2721	$Na_2HPO_3.5H_2O$	216.103	R.			438
2722	$Na_2HPO_4.2H_2O$	178.057	H.		1.848	
2723	$Na_2HPO_4.7H_2O$	268.134	M.	d.	1.679	437
2724	$Na_2HPO_4.12H_2O$	358.211	R. M.	34.6	1.52	433
2725	$Na_2H_2P_2O_6.6H_2O$	314.150	M.		1.849	504
2726	$Na_2H_2P_2O_7$	222.057	M.	d. 220	1.862	
2727	$Na_2H_2P_2O_7.6H_2O$	330.150	M.		1.848	454
2729	$Na_3HP_2O_6.9H_2O$	390.185	M.	d. 100	1.713	465
2730	$Na_3PO_4.H_3PO_4.15H_2O$	532.293		55		
2731	$Na_3PO_4.NaF.12H_2O$	422.197	C.		2.216	
2732	$2Na_3PO_4.NaF.19H_2O$	712.320	C.		2.217	74
2733	$NH_4NaHPO_4.4H_2O$—Microcosmic salt. Stercorite	209.129	M.	*ca* 79 d.	1.574	436
2734	Na_3AsO_4	207.951			2.835	
2735	$Na_3AsO_4.12H_2O$	424.136	Trig.	86.3	1.759	216
2736	$NaH_2AsO_4.H_2O$	181.988	R.		2.535	672
2737	$NaH_2AsO_4.2H_2O$	200.003	R.		2.309	546
2738	$Na_2HAsO_4.7H_2O$	312.070	M.		1.871	556
2739	$Na_2HAsO_4.12H_2O$	402.147	M.	28	1.72	441
2740	$2Na_3AsO_4.NaF.19H_2O$	800.192	C.		2.85^{25}	90
2741	$Na_3AsS_4.8H_2O$	416.334	M.	d.		879
2742	$2Na_2O.As_2O_5.2SO_3$	514.038			2.425^{21}	
2743	$(NH_4)NaHAsO_4.4H_2O$	253.065	M.		1.845^{17}	457
2744	$NaSb$	144.767		465		
2745	Na_3Sb	190.761		856		
2746	$NaSbO_2.3H_2O$	230.813	R.	d.	2.864	
2747	$Na_3SbS_4.9H_2O$	481.160	C.		1.839	
2748	Na_3Bi	277.991		775		
2749	Na_2C_2	69.9940			1.575^{15}	
2750	Na_2CO_3	105.994		851	2.533	
2751	$Na_2CO_3.H_2O$—Thermonatrite	124.009	R.		1.55	
2752	$Na_2CO_3.7H_2O$	232.102	R. Trig.	d. 35.1	1.51	
2753	$Na_2CO_3.10H_2O$—Natron	286.148	M.		1.46	431
2754	$NaCHO_2$	68.0017	M.	253	1.92	
2755	$NaHCO_3$	84.0047	M.		2.20	
2756	$NaC_2H_3O_2$	82.0201		324	1.528	
2757	$NaC_2H_3O_2.3H_2O$	136.063	M.	58; 78	1.45	452
2758	$NaHC_3H_2O_4.H_2O$—Acid malonate	144.036	R.			604
2759	$NaH(d\text{-}C_4H_4O_6).H_2O$	190.051	R.			628
2760	$NaC_4H_7O_4$—Diacetate.	142.051	C.			79
2761	$NaC_{16}H_{31}O_2$—Palmitate	278.236		*ca.* 270		
2762	$NaC_{18}H_{33}O_2$—Elaidate.	304.251		227		
2763	$NaC_{18}H_{33}O_2$—Oleate	304.251		235		
2764	$Na_2(d\text{-}C_4H_4O_6).2H_2O$	230.056	R.		1.818	
2765	$Na_2CO_3.NaHCO_3.2H_2O$—Tronite	226.030	M.		$2.147^{21.7}$	563
2766	$Na_3C_6H_5O_7.5H_2O$—Citrate	348.107	R.		$1.857_4^{23.5}$	
2767	$NaC_{10}H_6S_2O_6.2H_2O$—Naphthalene 1, 5-disulfonate	345.040	M.		1.777	809
2768	$Na_2(CH_2SO_3)_2.2H_2O$—Ethane disulfonate	270.186	M.		1.939 (α) 1.880 (β)	
2769	$NaCN$	49.0050		563.7		

Index No	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2770	$NaNH_4(\textit{meso}\text{-}C_4H_4O_6).H_2O$	207 082	M.		1.740	1074
2771	$NaNH_4(\textit{d}\text{-}C_4H_4O_6).4H_2O$.	261 128	R.		1.587	527
2772	$NaC_5H_8NO_4$ – Glutamate	169 067	M.			574
2773	$NaSCN$	81 0700	R.	562 3		
2774	$NaC_6H_4(NH_2)SO_3.2H_2O$—Sulfanilate	231 147	R.			696
2775	$NaC_{10}H_8NO_3S.4H_2O$ 1, 4-Naphthylamine sulfonate	317 193	M.			747
2776	$Na_2O.SiO_2$	122 054		1088		1040
2777	$Na_2O.2SiO_2$	182 114	R.	874		571
2778	Na_2SiF_6	188 054	H.		2 679	202
2779	$Na_2O.3TiO_2$	301 694	M.		3 5^{18}	
2780	$Na_2O.ZrO_2.6SiO_2.3H_2O$—Elpidite	599 400	R.		2 58	689
2781	$Na_2O.Pb(OH)Cl.SO_3$—Caracolite	401 725	R.		4 5	937
2782	$TlNa(\textit{dl}\text{-}C_4H_4O_6).2H_2O$	411 459	Tri.		3 289	
2783	$TlNa(\textit{meso}\text{-}C_4H_4O_6).2.5H_2O$	420 466	Tri.		3.120	
2784	$TlNa(\textit{d}\text{-}C_4H_4O_6).4H_2O$	447 489	R.		2 580	
2785	$NaTl_3(\textit{d}\text{-}C_4H_4O_6)_2$	932 259	R.		4 145	
2786	$ZnNaPO_4$	183 401	R.		3 3	
2787	$Zn(Na_2PO_4)_2$	347 416	C.		2 8	
2788	$Na_2SO_4.CdSO_4$	350 534		551		
2789	$Na_2SO_4.CuSO_4.2H_2O$ Kroehnkite	337 725	M.		2 06^{1}	715
2790	$Na_2SO_4.Cu(OH)_2.3CuSO_4.3H_2O$ Natrochalcite	772 596	M.	d. 350	2 33	840
2791	$NaCu(CN)_2$	138 583		d. 100	1 013	
2792	$Na_3IrCl_6.12H_2O$	691 024		50		
2793	$Na_2PtCl_4.4H_2O$	455 118		100 d.		
2794	$Na_2PtCl_6.6H_2O$	562 064	Tri.		2 50	
2795	$Na_2PtBr_6.6H_2O$	828 812	Tri.		3 323	
2796	$Na_2PtI_6.6H_2O$	1110 91	M. ?		3 707	
2798	$Na_2Ru(NO_2)_5.2H_2O$	413 765	M.			741
2799	$Na_2MnP_2O_7$	274 972			2 9	
2800	$Na_2O.2MnO.P_2O_5$ Natrophilite	345 902	R.		3 41	871
2801	$Na_4Mn(PO_4)_2$	336 966			2 7	
2802	$Na_2O.3Fe_2O_3.4SO_3.6H_2O$—Natrojarosite	969 386	R.		3 2	966
2803	$2Na_2O.Fe_2O_3.4SO_3.7H_2O$—Sideronatrite.	684 042	R.		2 2	725
2804	$3Na_2SO_4.Fe_2(SO_4)_3.6H_2O$—Ferrinatrite.	934 144	Trig.		2 55	271
2805	$Na_6Fe_2(C_2O_4)_6.10H_2O$	957 816	M.		1 973$^{17.5}$	
2806	$Na_2Fe(CN)_5NO.2H_2O$	297 913	R.		1 72	
2807	$Na_4Fe(CN)_6.12H_2O$	520 061	M.		1 458	616
2808	$Na_2O.Fe_2O_3.4SiO_2$—Aegirite	461 914	M		3 5	956
2809	$Na_2O.Fe_2O_3.FeO.5SiO_2$—Riebeckite	593 814	M.		3 44	887
2810	$Na_2O.2FeO.Fe_2O_3.6SiO_2$—Crocidolite	725 714	M.		3 2	893
2811	Na_2CrO_4	162 004	R.	392	2 723	
2812	$Na_2CrO_4.4H_2O$	234 066	M.	d. 64 8		
2813	$Na_2CrO_4.6H_2O$	270 096	Tri.	d. 25 9		
2814	$Na_2CrO_4.10H_2O$	342 158	M.		1 483	
2815	$Na_2Cr_2O_7.2H_2O$	298 045	M	320	2 52^{13}	892
2816	$Na_2O.2CrO_3.I_2O_5.2H_2O$	631 909			3 21	
2817	$Na_2Cr_2S_4$	278 274	H	d	2 55^{14}	
2818	$NH_4NaCrO_4.2H_2O$	193 077	R	d.	1 842^{15}	
2819	$NaCrP_2O_7$	219 055	R.		3	
2820	Na_2MoO_4	205 994		687	l. 2 590$_4^{1026}$	
2821	$Na_2Mo_2O_7$	349 994		612		
2822	$3Na_2O.7MoO_3.22H_2O$	1590 32	M.	*ca* 700		
2823	$3Na_2O.5MoO_3.P_2O_5.14H_2O$	1300 25	R.			818
2824	Na_2WO_4	293 994	R.	698	4 179 l. 3 613$_4^{996}$	
2825	$Na_2WO_4.2H_2O$	330 025	R.		3 245	
2826	$Na_2W_2O_6$	509 994			7 28	
2827	$Na_2W_3O_9$	741 994		d.	6 617	
2828	$Na_2W_4O_{12}$	973 994			7 195^{4}	
2829	$Na_2O.4WO_3.10H_2O$	1170 15	C.	706 6	3 847^{13}	
2830	$Na_2W_5O_{15}$	1205 99			7 283^{17}	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2831	$4Na_2O.10WO_3.23H_2O$	2982.33	M.	680.8	4.3	
2832	$5Na_2O.12WO_3.28H_2O$	3598.40	Tri.	705.8		
2833	$9Na_2O.22WO_3.51H_2O$	6580.73		683.3		
2834	$Na_2O.3UO_3$... .	920.504	R ?		6.912	
2835	$NaU(C_2H_3O_2)_3$	438.236	Tet.		2.56	100.1
2836	$NaVO_3$ ...	121.957	M ?	56$_2$	2.79	
2837	$Na_2O.V_2O_4.5V_2O_5$	1137.51	R ?	*ca* 800 d.		
2838	Na_3VO_4 .	183.951		*ca.* 866		
2839	$Na_3VO_4.10H_2O$	364.105	C H			127, 263
2840	$Na_3VO_4.12H_2O$	400.136	Trig			245
2841	$Na_4V_2O_7$ .. .	305.908	H	65$_4$		
2842	$2Na_3VO_4.NaF.19H_2O$	752.192	C			123
2843	$Na_3VSO_3.10H_2O$	380.170		18	1.773	
2844	$3Na_2O.V_2O_5.10WO_3.SiO_2.29H_2O$	3270.41	C.		3.344	
2845	Na_2CbO_3	187.094			4.19	
2846	$Na_2O.B_2O_3$	131.634		966		
2847	$Na_2O.2B_2O_3$	201.274		741	l. 2.5 glass 2.37	45
2848	$Na_2B_4O_7.10H_2O$ - Borax	381.428	M.	75	1.73	460
2849	$Na_2O.4B_2O_3$	340.554		783		
2850	$NaAlO_2$..	81.9570		1650		
2851	$2NaF.AlF_3$—Chiolite	167.954	Tet.		3.0	205
2852	$3NaF.AlF_3$—Cryolyte	209.950	M	100$_0$	2.90 l. 2.10^{1000}	427
2853	$Na_2O.Al_2O_3.4SO_3.12H_2O$ —Tamarugite	700.359	M. Tri.		2.03	494
2854	$Na_2O.Al_2O_3.4SO_3.22H_2O$—Mendozite	880.513	M. ?		1.88	449
2855	$Na_2SO_4.Al_2(SO_4)_3.24H_2O$	916.544	C.	61	1.675	72
2856	$Na_2O.3Al_2O_3.4SO_3.6H_2O$— Natroalunite	796.106	Trig. C.		2.6	287
2857	$Na_2O.Al_2O_3.P_2O_5.H_2O$—Fremontite	323.977	M ?		3.04	760
2858	$Na_2O.2AlOF.As_2O_5$—Durangite	396.834	M		4.0	806
2859	$Na_2O.Al_2O_3.2CO_2.2H_2O$—Dawsonite	287.944	R		2.4	653
2860	$Na_2O.Al_2O_3.2SiO_2$— Carnegieite	284.034	Tri. ?	1526	2.57	596
2861	$Na_2O.Al_2O_3.2SiO_2$—Nephelite	284.034	H	Tr 1248	2.67	266
2862	$Na_2O.Al_2O_3.3SiO_2.2H_2O$— Natrolite	380.125	R		2.25	478
2863	$Na_2O.Al_2O_3.4SiO_2$—Jadeite	404.154	M	105$_0$	3.34	834
2864	$Na_2O.Al_2O_3.4SiO_2.2H_2O$—Analcite	440.185	C.		2.25	229
2865	$Na_2O.Al_2O_3.6SiO_2$—Albite....	524.274	Tri	110$_0$	2.61	615
2866	$Na_2O.Al_2O_3.9SiO_2.2NaF$—Leifite	788.448	H.		2.57	248
2867	$Na_2O.3Al_2O_3.6SiO_2.2H_2O$—Paragonite.	761.145	M		2.8	750
2868	$2Na_2O.Al_2O_3.6SiO_2.H_2O$—Ussingite	604.283	Tri.		2.50	565
2869	$2Na_2O.3Al_2O_3.6SiO_2.7H_2O$— Hydronephelite	916.216	H		2.3	236
2870	$3Na_2O.3Al_2O_3.6SiO_2.2NaCl$—Sodalite	969.012	C.		2.2	99
2871	$3Na_2O.3Al_2O_3.18SiO_2.2NaCl$— Marialite.	1689.73	Tet		2.56	261
2872	$3Na_2O_3.3Al_2O_3.6SiO_2.2Na_2S$—Lazurite.	1008.22	C.		2.4	108
2873	$5Na_2O.3Al_2O_3.6SiO_2.2SO_3$—Noselite.	1136.22	C.		2.3	105
2874	$Na_2La(NO_3)_5.H_2O$	512.959	M		2.63$^{9}_{4}$	
2875	$Na_2Ce(NO_3)_5.H_2O$	514.299			2.65$^{9}_{4}$	
2876	$Na_2O.2BeO.P_2O_5$—Beryllonite	254.082	R.		2.85	679
2877	$Na_2O.2BeO.6SiO_2.H_2O$—Epididymite	490.409	R		3.55	700
2878	$Na_2O.2BeO.6SiO_2.H_2O$—Eudidymite.	490.409	M.		2.55	657
2879	$Na_2SO_4.MgSO_4$	262.444	R.		2.729	
2880	$Na_2O.MgO.2SO_3.2.5H_2O$— Loeweite	307.483	Trig.	Tr. 71	2.37	232
2881	$Na_2O.MgO.2SO_3.4H_2O$—Bloedite	334.506	M.		2.23	498
2882	$3Na_2O.MgO.4SO_3$—Vanthoffite	546.562	M. ?		2.69	497
2883	$NaMgPO_4$	142.341			2.5	
2884	$Na_2MgP_2O_7$...	244.362	C. ?		2.2	
2885	$Na_2Mg(CO_3)_2$.	190.344	Tet.		2.729^{15}	
2886	$NaCl.Na_2CO_3.MgCO_3$—Northrupite	248.769	C.		2.377^{15}	118
2887	$3Na_2O.2MgO.4CO_2.SO_3$—Tychite	522.687	C.		2.52	113
2889	$Na_2O.CaO.2SO_3$—Glauberite	278.194	M.		2.83	625
2890	$Na_2O.CaO.2SO_3.4H_2O$—Wattevillite	350.257	M.		1.81	446
2891	$3Na_2O.3CaO.2P_2O_5$...	638.288	M.		2.1	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2893	$Na_2O.CaO.2CO_2.2H_2O$—Pirssonite	242.095	R.	813	2.35	567
2894	$Na_2O.CaO.2CO_2.5H_2O$—Gaylussite	296.141	M.		1.94	580
2895	$Na_2O.4CaO.6SiO_2.H_2O$—Pectolite	664.650	M.		2.73	766
2896	$Na_2O.2CaO.5B_2O_3.16H_2O$—Ulexite	810.580	M.	d.	1.95	551
2897	$NaF.CaF_2.AlF_3.H_2O$—Pachnolite	222.042	M.		2.98	429
2898	$NaF.CaF_2.AlF_3.H_2O$—Thomsenolite	222.042	M.		2.98	430
2899	$Na_2O.CaO.2Al_2O_3.10SiO_2.20H_2O$—Faujasite	1282.81	C.		1.92	92
2900	$Na_2O.2CaO.3Al_2O_3.9SiO_2.8H_2O$—Mesolite	1161.56	Tri.		2.27	555
2901	$Na_2O.2CaO.3Al_2O_3.9SiO_2.8H_2O$—Pseudomesolite	1161.56	Tri.		2.22	531
2902	$5(Na_2, Ca)O.3Al_2O_3.6SiO_2.2SO_3$—Hauynite		C.		2.4	106
2903	$NaF.CaO.BeO.2SiO_2$—Leucophanite	243.207	R.		2.96	743
2904	$NaF.2CaO.2BeO.3SiO_2$—Meliphanite	384.357	Tet.		3.01	297
2905	$NaCaMgAlSi_4O_{12}$—Tuxtlite	418.587	M.		3.27	870
2906	Na_2SrSO_7	277.679		280		
2907	$Na_2Sr(CO_3)_2$	253.614		750		
2908	$Na_4SrCa(CO_3)_4$	459.678		720		
2909	$Na_2Ba(CO_3)_2$	303.364		740		
2910	$2Na_2O.BaO.2TiO_2.10SiO_2$—Leucosphenite	1037.76	M.		3.1	849
2911	$Na_4BaCa(CO_3)_4$	509.428		660		
2912	$NaLi(dl\text{-}C_4H_4O_6).2H_2O$	213.998	M.			506
2913	$3NaF.3LiF.2AlF_3$—Cryolithionite	371.728	C.		2.78	67
2914	K_2O	94.1900			2.32	
2915	K_2O_4 .	142.190		>280		
2916	KH	40.1027		d.	0.80	
2917	KOH	56.1027		Tr. 260 380	2.044 l. 1.87_4^{380}	
2918	KF	58.0950		880	2.48 l. 1.869_4^{913}	
2919	$KF.2HF$	98.1104		105		
2920	$KF.3HF$	118.118		100		
2921	KCl—Sylvite	74.5530	C.		1.988	103
2922	$KClO_3$	122.553	M.	368.4	2.32	579
2923	$KClO_4$	138.553	R.	d. 400	2.52	
2924	KBr	119.011		730	2.75	134
2925	$KBrO_3$	167.011	Trig.	370 d.	$3.27^{17.5}$	
2926	KI	166.027	C.	773	3.123	150
2927	KI_3	419.891	M.	45	3.498	
2928	KIO_3	214.027	M.	560	3.89	
2929	KIO_4	230.027	Tet.	582	3.618	
2930	$K_2H_3IO_6.3H_2O$	358.191	Tri.			541
2931	$KICl_2$	236.943	M.	60		
2932	$KIBr_2$	325.859	R.	60		
2933	K_2S	110.255		471 Tr. 146.4	1.805	
2934	$K_2S.5H_2O$	200.332		60		
2935	K_2S_3	174.385		252.0		
2936	K_2S_4	206.450		>145		
2937	K_2S_5	238.515		206.0		
2938	K_2SO_4—Arcanite	174.255	R.	Tr. 588 1067	2.662	519
2939	$K_2S_2O_3$	190.320	C.	d. 400		
2940	$K_2S_2O_3.0.33H_2O$	196.325	M.		2.23	
2941	$K_2S_2O_6$ . .	238.320	Trig		2.278	215
2942	$K_2S_2O_7$ . .	254.320		>300	2.277	
2943	$K_2S_2O_8$	270.320	Tri.			458
2944	$K_2S_3O_6$	270.385	R.		2.304	472
2945	$K_2S_4O_6$	302.450	M.		2.296	
2946	$K_2S_5O_6.1.5H_2O$ . .	361.538			2.112	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
2947	KSH	72 1677		455		
2948	$KHSO_4$—Misenite	136 168	R. M	210	2 35	
2949	KHS_2O_7	216 233		168		
2950	$K_2SO_4.KHSO_4$	310 423	M.		2 59^{18}	508
2951	$4K_2SO_4.3H_2SO_4$	991 261		d. <25	2 277^{18}	
2952	KSO_3F	138 160		311		
2953	$KI.4SO_2$	422 287		0 26		
2954	K_2Se	157 390			2 851	
2955	K_2SeO_4	221 390	R.		3 066	646
2956	K_2SeSO_7	301 455		120		
2957	$K_2H_2TeI_2O_{10}.2H_2O$	657 600	Trig.			397
2958	KNO_2	85.1030		297	1 915	
2959	KNO_3—Niter	101 103	R. Trig.	Tr. 129 R. to Trig 333	2 11$^{10\ 6}$	556
2960	KNH_2	55 1184		338		
2961	$KNO_3.2HNO_3$	227 134		22		
2962	$KBr.4NH_3$	187 135		45		
2963	$KNO_3.KHSO_4$	237 271			2 38	
2964	$5K_2O.(NH_4)_2O.6SO_3$—Taylorite	1003 42				440
2965	KPO_3	118.119		Tr. 450 810	2 258$^{14\ 5}$ 2 068^{900}	
2966	K_3PO_4	212 309		1340		
2967	$K_4P_2O_7$	330.428		Tr. 278 1090	2 33	
2968	KH_2PO_4	136 134	Tet.	96	2 338	244
2969	$K_2H_2P_2O_6.2H_2O$	274 284	M.	d.		624
2970	$K_2H_2P_2O_6.3H_2O$	292 300	R.	d.		483
2971	KH_2AsO_4	180 070	Tet.	288	2 867	278
2972	$5K_2O.As_2O_5.8SO_3.6H_2O$	1449 48			2 289	
2973	KSb	160 865		605		
2974	K_3Sb	239 055		812		
2975	K_2CO_3	138 190		891	2 29	
2976	$(KCO)_2$	134 190		78		
2977	$K_2C_2O_4.H_2O$	184 205	M.		2 13	486
2978	$K_2O.2CO_2.H_2O$—Kalicinite	200 205	M.	d. <200	2 17	476
2979	$2K_2CO_3.3H_2O$	330 426	M.		2 043	
2980	$KCHO_2$	84 1027		167 5	1 91	
2981	KHC_2O_4	128 103	M.		2 0	655
2982	$KHC_2O_4.H_2O$	146 118			2.044	
2983	$KC_2H_3O_2$	98 1181		292	1 8	
2984	$KC_4H_5O_4$—Acid succinate	156 134	M.	242 d.	1 767	
2985	$KC_4H_5O_4.2H_2O$—Acid succinate	192 164	R.		1 616	617
2986	$KH(d\text{-}C_4H_4O_6)$	188 134	R.		1 956	
2987	$KH(dl\text{-}C_4H_4O_6)$	188 134	M.		1.954	
2988	$KH(C_2H_2O_2)_2$	158 149		142		
2989	$KC_6H_7O_7$—Citrate	230 149	Tri.		1 906	
2990	$KC_2H_3O_2.2C_2H_4O_2$	218 180		112	1 47	
2991	$KHC_8H_4O_4$—Acid phthalate	204 134	R.		1 636	
2992	$KH(C_4H_5O_4)_2$—Disuccinate	274 180	M.	162	1 56	
2993	$KC_9H_7O_4.2H_2O$—Acetylsalicylate	254 180		65		
2994	$KC_{18}H_{33}O_2$—Oleate	320 349				1037
2995	$K_2C_4H_4O_4.3H_2O$—Succinate	248 267	R.		1.564	
2996	$K_2(d, l\text{-}C_4H_4O_6)$	226 221	M.		1.984	
2997	$K_2(d\text{-}C_4H_4O_6).0.5H_2O$	235 229	M.		1.98	610
2998	$2K_2C_2O_4.H_2C_2O_4.2H_2O$—Tetraoxalate	458 426	R.		1 213^{22}	592
2999	$KH(CCl_3CO_2)_2$	364 851	Tet.		2 005$_4^{18}$	
3000	$KC_2H_5O_4S$—Ethyl sulfate	164 199	M.		1.843	
3001	$KC_6H_5O_4S$—p-Phenolsulfonate	212 199	R.	>260	1 87	770
3002	$KC_6H_5O_4S.2H_2O$—o-Phenolsulfonate	248 229	R.		1 734	697
3003	$KC_6H_5O_7S_2.H_2O$—2, 4-Phenoldisulfonate	309 271	R.			768
3004	$CH_2(SO_3K)_2$—Methane disulfonate	252 335	M.		2 376	645
3005	$K_2C_{10}H_6O_6S_2.2H_2O$—Naphthalene 1, 5-disulfonate	336 397	M.		1.797	859

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3006	KCN	65 1030		634.5	1.52^{16}	
3007	KCNO	81 1030			2.048	
3008	$KNH_4(d\text{-}C_4H_4O_6).0\ 5H_2O$	214 172			1.700	
3009	$KC_5H_2N_4O_6$ - Acid uroxasate	253 142				1038
3010	$KC_6H_2O_7N_3$ Picrate	267 134	R		1.852	982
3011	KCNS	97 1680		173.2	1 886	
3012	$K(SbO)(d\text{-}C_4H_4O_6)\ 0\ 5H_2O$ Tartar emetic	333 904	R.		2 607	810
3013	$K_2O\ SiO_2$	154 250		976		
3014	$K_2O\ 2SiO_2$	214 310	R ?	1041		532
3015	$K_2O\ 4SiO_2\ H_2O$	352 445	R.	d. 400	2 417	634
3016	K_2SiF_6- Hieratite	220 250	C.		2 665	
3017	$K_2Ti_2O_5$	253 990		980		
3017 5	K_2ZrF_6	283 190	M.			1037 2
3017 6	K_3ZrF_7	341 285	C.			68.2
3018	$K_2Sn(OH)_6$	298 936	Trig.		3.197	
3019	K_2SnCl_6	409 638	C.		2.71	147
3020	K_2SnBr_6	676 386			3.783	
3021	$K_2SnS_3.3H_2O$	347 131			$1\ 847_4^{18}$	
3022	KPb_2Cl_5	630 785	R.	440		
3023	K_2PbCl_6	498 138	C.	d 190		
3024	$KC_2H_3O_2\ PbI(C_2H_3O_2)$	491 273		208 5		
3025	$KGa(SO_4)_2\ 12H_2O$	517 130	C		1 895	86
3026	$K_3InCl_6\ 2H_2O$	480 864	Tet		2 483	
3027	$K_3InBr_6\ 2H_2O$	747 612	Tet		3 140	
3028	$K_3TlCl_6\ 2H_2O$	570 464	Tet		2 859	
3029	$K_2SO_4.ZnSO_4.6H_2O$	443 792	M	d. 121	$2\ 24_5$	482
3030	$K_2Zn(SeO_4)_2\ 2H_2O$	466 001	Tri.		3 21	
3031	$K_2Zn(SeO_4)_2\ 6H_2O$	538 062	M.		2 554	588
3032	$K_2Zn(CN)_4$	247 602	C	d. 150		70
3033	$4KCl.CdCl_2$	481 538	Trig.		2 5	293
3034	$K_2Cd(NO_2)_4$	374 632	R.			691
3035	$CdKPO_4$	246 529	R.		3.8	
3036	$KCl\ 2HgCl_2\ 2H_2O$	653 636	R		$4\ 11_{15}^{15}$	
3037	$2KCl\ HgCl_2\ H_2O$	438 647	R		$3\ 58_{15}^{15}$	877
3038	$KBr.HgBr_2$	479 453			4 40	
3039	$KBr.HgBr_2\ H_2O$	497 468			3 865	
3040	$KI\ HgI_2\ H_2O$	638 516		10_4		
3041	$2KCN\ Hg(CN)_2$	382 832	Tet.		$2\ 447^{21\ 3}$	
3042	$2KCl\ CuCl_2\ 2H_2O$	319 623	Tet		2 41	312
3043	$K_2O.CuO\ 2SO_3\ 6H_2O$ Cyanochroite.	441 982	M		$2\ 2_2$	491
3045	$K_2SeO_4\ CuSeO_4.6H_2O$	536 252	M		2 527	603
3046	$K_2CO_3\ CuCO_3$	261 760			$1\ 35^{65}$	
3047	$K_3Cu(CN)_4$	284 887	Trig.			121
3048	$KNO_3\ AgNO_3$	270 991	M.	125	3 219	
3049	$2KNO_2\ AgNO_2\ Bi(NO_2)_3$	671 118			3 33	
3050	$KAgCO_3$	206 975		d.	3 769	
3051	$KAuCl_4$	378 127	M.	357		
3052	$K_4Os(CN)_6.3H_2O$	557 274	M.			769
3053	K_2IrCl_6	484 038	C.	d.	3 546	
3054	$K_2SO_4\ Ir_2(SO_4)_3\ 24H_2O$	1281 02	C	10_3		
3055	$K_3Ir(C_2O_4)_3\ 4H_2O$	646 447	Tri.		$2\ 510_{19}^{19}$	
3056	$K_3IrCl_2(C_2O_4)_2\ H_2O$ Chloroxalate	615 316	M.			736
3057	$K_3IrCl_2(NO_2)_2C_2O_4\ 2H_2O$ Dichloro dinitro oxalate	597 348	R.			716
3058	K_2PtCl_4	415 252	Tet.		3 30	
3059	K_2PtCl_6	486 168	C.	d 250	3 499	
3060	K_2PtBr_6	752 916	C.	> 400 d.	4 66	
3061	K_2PtI_6	1035.01	C.		5.18	
3062	$K_2S\ 3PtS.PtS_2$	1051 50		d.	$6\ 44^{15}$	
3063	$[Pt(NH_3)Cl_3]K.H_2O$	375 746	R.			709
3064	$K_2Pt(NO_2)_2Br_2.H_2O$	543 283	Tri.			858
3065	$K_2Pt(NO_2)_2I_2\ 2H_2O$	655 331	Tet.			362

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3066	$K_2Pt(C_2O_4)_2.2H_2O$	485.451	M.		3.03	
3067	$K_2Pt(CN)_4$	377.452	R.		2.45	
3068	$K_2Pt(NO_2)_2C_2O_4.H_2O$	471.451	M.			817
3069	$K_2Pt(SCN)_6$	621.858	H.		3.70^{19}	
3070	$K_2Pt(SCN)_6.2H_2O$	657.889	M R		2.342^{18}	
3071	$K_2Pt(SeCN)_6$	904.668	R.	d 80	3.378$^{12.5}$	
3072	$KRuO_4.H_2O$	222.810	Tet.	d. 400^{vac}		
3073	$K_4Ru(CN)_6.3H_2O$	468.174	M			722
3074	$K_3Rh(CN)_6$	376.243	M			669
3075	K_2PdCl_4	326.722			2.67	
3076	K_2PdCl_6	397.638	C.		2.738	
3077	$KMnO_4$	158.025	R.	d <240	2.703	291
3078	$K_2MnCl_4.2H_2O$	310.983	Tri.		2.221	
3079	K_4MnCl_6—Chloromanganokalite	424.058	Trig.		2.31	
3080	$K_2SO_4.MnSeO_4.2H_2O$	408.416	Tri.		3.07	
3081	$K_3Mn(CN)_6$	328.695	M.			1055
3082	$K_2Fe(SO_4)_2$	326.160			2.177	
3083	$K_2Fe(SO_4)_2.6H_2O$	434.252	M.		2.169	479
3084	$K_2Fe_2(SO_4)_4.24H_2O$	1006.50	C.	33	1.831	97
3085	$K_2O.3Fe_2O_3.4SO_3.6H_2O$—Jarosite	1001.58	R.		3.2	370
3086	$K_6Fe_2(CrO_4)_4.6H_2O$	806.342	M.		1.448$^{17.5}$	678
3087	$K_3Fe(CN)_6$	329.173	M		1.894^{17}	699
3088	$K_4Fe(CN)_6$	368.268			1.898^{15}	
3089	$K_4Fe(CN)_6.3H_2O$	422.314	M.			714
3090	$2KF.CoF_2$	213.160	M.		3.22	
3091	$K_2SO_4.CoSO_4.6H_2O$	437.382	M		2.218	492
3092	$K_2SeO_4.CoSeO_4.6H_2O$	531.652	M.		2.514	589
3093	$[Co(NH_3)_2(NO_2)_4]K$	316.159	R		2.076	
3094	$K_2Co(C_3H_2O_4)_2$—Malonate	341.191			2.234	
3095	$K_3Co(CN)_6$	332.303	M		1.906	
3096	$K_2SO_4.NiSO_4.6H_2O$	437.102	M	d. <100	2.237	514
3097	$K_2Ni(SeO_4)_2.6H_2O$	531.372	M.	d <100	2.539	608
3098	$K_2Ni(COS)_4$	377.140	M.		2.132$_4^{18.4}$	125
3099	$2KCN.Ni(CN)_2.H_2O$	258.927	M.		1.871$^{14.5}$	
3100	$K_2O.CrO_3$—Tarapacaite	194.200	R.	975	2.732^{18}	927
3101	$K_2Cr_2O_7$	294.210	Tri	398	2.69	924
3102	$K_2Cr_3O_{10}$	394.220	M.	250	2.648	
3103	$K_2Cr_4O_{13}$	494.230	M.	215	2.649	
3104	$KCrClO_3$	174.563	M.	d.	2.497^{19}	
3105	$K_2O.2CrO_3.I_2O_5$	628.074			3.66	
3106	K_2CrSO_7	274.265		350		
3107	$K_2SO_4.Cr_2(SO_4)_3.24H_2O$	998.840	C		1.83	95
3108	K_2CrSeO_7	321.400		120		
3109	$3K_2CrO_4.2(NH_4)_2CrO_4$	886.775			2.403^{16}	
3110	$K_2O.Cr_2O_3.2P_2O_5$	530.306	M.		3.5^{20}	
3111	$K_3Cr(CN)_6$	325.343	M.	150 d	1.71	607
3112	$K_3Cr(SCN)_6.4H_2O$	589.795	R.		1.711^{16}	
3113	$K_2Cr_2O_7.HgCl_2$	565.736	R.		3.531^{11}	
3114	$K_2Cr_2O_7.Hg(CN)_2.2H_2O$	582.867	R			1077
3115	K_2MoO_4	238.190		919	l. 2.342$_4^{961}$	
3116	K_2WO_4	326.190	M	921 Tr. 388	3.120$_4^{991}$	
3117	$K_2W_2O_7$	558.190		555		
3118	$K_2O.8WO_3$	1950.19			6.53	
3119	$K_2SeO_4.Cr_2(SeO_4)_3.24H_2O$	1187.38			2.078$^{17.5}$	
3120	$K_4U(C_2O_4)_4.5H_2O$	772.627	M		2.563	
3121	$KUO_2(C_2H_3O_2)_3.H_2O$	504.350	Tet.		2.396	
3122	$KV(SO_4)_2.12H_2O$	498.370			1.782	
3123	$K_4V_2S_6O.3H_2O$	520.736			2.144	
3124	$K_2O.2UO_3.V_2O_5.8H_2O$—Carnotite	960.573	H. R.			988
3125	$3K_2O.SiO_2.V_2O_5.10WO_3.22H_2O$	3240.89	C.		3.664	
3126	$7K_2O.2SiO_2.3V_2O_5.18WO_3.42H_2O$	6257.86	M. Tri.		3.537	
3127	$NH_4K_5O_3.SiO_2.V_2O_5.10WO_3.23H_2O$	3237.85			3.74	

Index No.	Formula	Mol. wt.	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3128	$2KF.TaF_5$	392.690	R.		4.56	
3129	$K_2O.B_2O_3$	163.830	M.	947		
3130	KBF_4	125.915	C. R.	500 d.	2.50	
3131	$KBO_2.KPO_3$	200.034		872		
3132	$3KF.AlF_3$	258.245		1035 Tr. 300		
3133	$K_2O.Al_2O_3.4SO_3.24H_2O$—Kalinite	948.740	M. C.		1.75	77. 442
3134	$K_2O.3Al_2O_3.4SO_3.6H_2O$—Alunite	828.302	Trig.		2.60	281
3135	$KAl(SeO_4)_2.12H_2O$	568.640	C.		2.001	93
3136	$K_2O.Al_2O_3.2SiO_2$—Kaliophilite	316.230	H.	>1745	2.6	258
3137	$K_2O.Al_2O_3.4SiO_2$—Leucite	436.350		>1800	2.47	114
3138	$K_2O.Al_2O_3.6SiO_2$—Microcline	556.470	Tri.	1150	2.56	613
3139	$K_2O.Al_2O_3.6SiO_2$—Orthoclase	556.470	M.	1170 d.	2.56	606
3140	$K_2O.3Al_2O_3.6SiO_2.2H_2O$—Muscovite	796.341	M.	d.	2.9	731
3141	$2Al_2O_3.3B_2O_3.K_2O$—Rhodizite	506.950	C.		3.4	151
3142	$K_2La(NO_3)_5.1.5H_2O$	554.163	R.	d. 60	2.54_4^0	
3143	$K_2Ce(NO_3)_5.2H_2O$	564.511	R.	d. 180		
3143.5	K_2HfF_6	371.19	M.			1037.1
3143.6	K_3HfF_7	429.285	C.			68.1
3144	$KMgF_3$	120.415			2.8	
3145	K_2MgF_4	178.510			2.7	
3146	$KCl.MgCl_2.6H_2O$—Carnallite	277.881	R.	167	1.60	467
3147	$KI.MgI_2.6H_2O$	552.303			2.547	
3148	$K_2SO_4.MgSO_4.4H_2O$—Leonite	366.702	M.		2.25	493
3149	$K_2O.MgO.2SO_3.6H_2O$—Picromerite	402.732	M.	d. 72	2.15	451
3150	$K_2SO_4.2MgSO_4$—Langbeinite	415.025	C.		2.83	128
3151	$KCl.MgSO_4.3H_2O$—Kainite	248.984	M.		2.13	553
3152	$K_2Mg(SeO_4)_2.6H_2O$	497.002	M.		2.34	527
3153	$KMgPO_4$	158.439	R.		2.6	
3154	$K_2Mg(P_2O_6)_2$	576.654	M.		2.4	
3155	$KHMg(CO_3)_2.4H_2O$	256.484	Tri.	d. 100	1.98	
3156	$K_2Mg(CrO_4)_2.2H_2O$	370.561	Tri.		2.60^{15}	
3157	$K_2O.4MgO.11B_2O_3.18H_2O$—Heintzite	1345.79	M.		2.1	611
3158	$KCl.CaCl_2$—Chlorocalcite	185.539	C.	754		591
3159	$K_2O.CaO.2SO_3.H_2O$—Syngenite	289.310	M.		2.60	581
3160	$K_2CaP_2O_7$	292.308	H.		2.7	
3161	$K_2Ca(CO_3)_2$	238.260	R.	790		
3162	$K_2O.8CaO.16SiO_2.16H_2O$—Apophyllite	1791.96	C.		2.35	259
3163	$K_2CrO_4.CaCrO_4.2H_2O$	386.311	Tri.		2.502	
3164	$K_2O.4CaO.2Al_2O_3.24SiO_2.H_2O$—Milarite	1981.77	H.		2.57	254
3165	$K_2O.2CaO.MgO.4SO_3.2H_2O$—Polyhalite	602.941	R.		2.78	685
3166	$K_2SO_4.4CaSO_4.MgSO_4.2H_2O$—Krugite	875.211			2.801	
3167	$KCl.2SrCl_2$	391.625		638		
3168	$2KCl.SrCl_2$	307.642	R.	597		
3169	$K_2SrP_2O_7$	339.858	H.		2.9	
3170	$KSrCr(C_2O_4)_3.6H_2O$	550.817			$2.155^{12.8}$	
3171	$K_2Ba(CO_3)_2$	335.560		800		
3172	$K_4BaCa(CO_3)_4$	573.820		758		
3173	$LiKSO_4$	142.099	H.		2.393	218
3174	$2KNO_2.LiNO_2.Bi(NO_2)_3$	570.177			3.21_4^{15}	
3175	$LiKCO_3$	106.034		515		
3176	$LiK(d\text{-}C_4H_4O_6).H_2O$	212.080	R.			601
3177	$KLi(dl\text{-}C_4H_4O_6).H_2O$	212.080	M.		1.610	1075
3178	$KLiPt(CN)_4.3H_2O$	399.342	R.			798
3179	$K_2Li_2Fe(CN)_6.3H_2O$	358.002	M.			753
3180	$KLiMoO_4.H_2O$	224.049	R.		2.696	
3181	$K_3Na(SO_4)_2$—Glaserite	332.412	Trig.	<1000	2.696	237
3182	$KNaHAsO_4.7H_2O$	328.168			1.884	
3183	$KNa(dl\text{-}C_4H_4O_6).3H_2O$	264.169	M.		1.783	
3184	$KNaC_4H_4O_6.4H_2O$—Rochelle salt	282.184	R.		1.790	517
3185	$KCl.11Na_2O.9SO_3.2CO_2$—Hanksite	1565.07	H.		2.56	222
3186	$3KCl.NaCl.FeCl_2$—Rinneite	408.870	Trig.		2.35	290
3187	$K_3Na(CrO_4)_2$	372.302	Trig.		2.767	351

Index No.	Formula	Mol. wt.	Crystal system	M. P	d_4^{20}	Ref. ind. finding No.
3188	$5K_2W_4O_{13}.2Na_4W_5O_{16}$	7534 93			7 117	
3189	$(CaK_2Na_2)O.Al_2O_3.6SiO_2.6H_2O$—Erionite		R.		2 0	435
3190	Rb_2O	186 880		d. 400	3 72	
3191	Rb_2O_2	202 880			3 65	
3192	Rb_2O_3	218 880			3 53	
3193	Rb_2O_4	234 880		280	$3\ 05^{0}$	
3194	RbH	86 4477		d 300	2	
3195	$RbOH$	102 448		300	$3\ 203^{11}$	
3196	RbF	104 440		760	l. $2\ 88^{820}$	
3197	$RbCl$	120 898		715	2 76	104
					l. $2\ 088_4^{750}$	
3198	$RbClO_3$	168 898			3 19	
3199	$RbClO_4$	184 898	R		2 9	
3200	$RbBr$	165 356	C	682	3 35	133
					l. $2\ 795_4^{750}$	
3201	$RbBr_3$	325 188	R	d. 140		
3202	$RbBrO_3$	213 356		430	3 68	
3203	$RbBrCl_2$	236 272	R	d. 110		
3204	$RbBr_2Cl$	280 730	R.	76		
3205	RbI	212 372	C	642	3 55	146
					l. $2\ 873_4^{675}$	
3206	RbI_3	466 236	R	190		
3207	$RbIO_3$	260 372	M ?, C	d	$4\ 33^{19.5}$	
3208	$RbIO_4$	276 372	Tet.		$3\ 918^{16}$	
3209	$RbICl_2$	283 288	R	190		
3210	$RbIBr_2$	372 204	R.	225		
3211	$RbIBrCl$	327 746	R	205		
3212	Rb_2S	202 945			2 912	
3213	Rb_2S_3	267 075		213		
3214	Rb_2S_5	331 205		225	$2\ 618^{15}$	
3215	Rb_2SO_4	266 945	R.	1060	3 613	576
				Tr. 653	l. $2\ 529_4^{1100}$	
3216	$Rb_2S_2O_6$	331 010	H.			217
3217	$Rb_2S_2O_8$	363 010	M.			502
3218	$RbHSO_4$	182 513			$2\ 892^{16}$	
3219	$RbI.4SO_2$	468 632		13 5		
3220	Rb_2SeO_4	314 080	R		3 90	673
3221	$RbNO_3$	147.448	H	Tr. 161 4 to C.	3 11	594
			C	Tr. 219 to R.	l. $2\ 395_4^{400}$	
			R Tri	310		
3222	$RbNO_3.HNO_3$	210 464	Tet	62		
3223	$RbNO_3.2HNO_3$	273 479		45		
3224	Rb_2CO_3	230 880		837		
3225	$RbH_3(C_2O_4)_2.2H_2O$	300 494	Tri.		$2\ 125^{18}$	
3226	$Rb(dl\text{-}C_4H_5O_6)$	234 479	Tri		2 282	
3227	$Rb(meso\text{-}C_4H_5O_6).0.5H_2O$	243 486	Tri.		2 399	
3228	$RbHC_8H_4O_4$—Phthalate	250 479	R		1 933	
3229	$Rb_2(d\text{-}C_4H_4O_6)$	318 911	Trig.		2 692	
3230	$Rb_2(meso\text{-}C_4H_4O_6).H_2O$	336 926	Tri		2 584	560
3231	$Rb_2(meso\text{-}C_4H_4O_6).2H_2O$	354 942	M.			496
3232	$Rb_2C_6H_6O_7$—Citrate	360 926		212 d.		
3233	$RbH(CCl_3CO_2)_2$	411 196	M.		$2\ 150^{15}$	
3234	$RbSCN$	143 513		195		
3235	Rb_2SiF_6	312 940			3 332	
3236	$RbTi(SO_4)_2.12H_2O$	541 655	C.			199
3237	$RbPbCl_3$	399 014	R.	440		
3238	$RbPb_2Cl_5$	677 130	R.	423		
3239	$RbGa(SO_4)_2.12H_2O$	563 475	C.		1 962	87
3240	$Rb_2InCl_5.H_2O$	480 985	R.		3 087	
3241	$Rb_2InBr_5.H_2O$	703 275			3 409	
3242	$RbIn(SO_4)_2.12H_2O$	608 555	C.	42	2 065	83
3243	$Rb_2TlCl_5.H_2O$	570 585			3 513	

Index No.	Formula	Mol. wt	Crystal system	M. P.	d_4^{20}	Ref. ind. finding No.
3244	$Rb_2TlBr_4.2H_2O$	976.247			4.077	
3245	$Rb_2Zn(SO_4)_2.6H_2O$	536.482	M.		2.591	499
3246	$Rb_2Zn(SeO_4)_2.6H_2O$	630.752	M.		2.860	598
3247	$Rb_2Cd(SO_4)_2.6H_2O$	583.512			2.695	485
3248	$2RbCl.CuCl_2.2H_2O$	412.313			2.895	
3249	$Rb_2Cu(SO_4)_2.6H_2O$	534.672	M.		2.57	510
3250	$Rb_2AgBi(NO_2)_6$	763.808			3.67^{15}	
3251	$Rb_2SO_4.Ir_2(SO_4)_3.24H_2O$	1373.71	C	109		
3253	$RbRh(SO_4)_2.12H_2O$	596.665	C			109
3254	$RbMnO_4$	204.370			$3.235^{10.4}$	
3255	$Rb_2Mn(SO_4)_2.6H_2O$	526.032	M		2.46	474
3256	$RbFeCl_3.2H_2O$	283.685			2.711	
3257	$Rb_2FeCl_4.2H_2O$	404.583			2.850	
3258	$Rb_2Fe(SO_4)_2.6H_2O$	526.942	M.		2.518	495
3259	$RbFe(SO_4)_2.12H_2O$	549.595	C.		1.92	98
3260	$Rb_2FeSe_2O_8.6H_2O$	621.212			2.819	
3261	$Rb_2SeO_4.Fe_2(SeO_4)_3.24H_2O$	1287.73	C	45	2.131^{15}	111
3262	$Rb_2Co(SO_4)_2.6H_2O$	530.072	M		2.567	515
3263	$Rb_2Co(C_3H_2O_4)_2.4H_2O$--Malonate	505.942			2.131	
3264	$Rb_2SO_4.NiSO_4.6H_2O$	529.792	M.		2.586	523
3265	$Rb_2SO_4.Cr_2(SO_4)_3.24H_2O$	1091.53	C.	107	1.946	96
3266	$RbV(SO_4)_2.12H_2O$	544.715			1.915^4	
3267	$3RbF.AlF_3$	397.280		985		
3268	$Rb_2SO_4.Al_2(SO_4)_3.24H_2O$	1041.43	C.		1.867^0	78
3269	$Rb_2La(NO_3)_5.4H_2O$	691.892	M.	86	2.497^0	
3270	$Rb_2Ce(NO_3)_5.4H_2O$	693.232	M.	70	2.497^0	
3271	$Rb_2Pr(NO_3)_5.4H_2O$	693.902		63.5	2.50^0	
3272	$Rb_2Nd(NO_3)_5.4H_2O$	697.252		47	2.56^0	
3273	$Rb_2Mg(SO_4)_2.6H_2O$	495.422	M.		2.40	461
3274	$Rb_2Mg(SeO_4)_2.6H_2O$	589.692	M		2.684	549
3275	$Rb_2Mg(CrO_4)_2.6H_2O$	535.312	M		2.466	805
3276	$RbLi(d\text{-}C_4H_4O_6).H_2O$	258.425	R		2.281	671
3277	$RbNa(meso\text{-}C_4H_4O_6).2.5H_2O$	301.506	Tri		2.20	
3278	Cs_2O	281.620			4.36	
3279	Cs_2O_3	313.620		400	4.25^0	
3280	Cs_2O_4	329.620		600 515 (in O_2)	3.68^0	
3281	CsH	133.818			2.7	
3282	$CsOH$	149.818		Tr. 223 272.3	3.675	
3283	CsF	151.810		683	3.586_4^{750} l. 2.549	
3284	$CsCl$	168.268	C	646	3.97 l. 2.732_4^{700}	144
3285	$CsClO_3$	216.268			$3.57^{19.5}$	
3286	$CsClO_4$	232.268			3.327	
3287	$CsBr$	212.726	C.	636	4.44 l. 3.038_4^{700}	152
3288	$CsBr_3$	372.558	R	180		
3289	$CsBrO_3$	260.726		420	$4.10^{19.5}$	
3290	$CsBrCl_2$	283.642		205		
3291	$CsBr_2Cl$	328.100		191		
3292	CsI	259.742	C	621	4.51 l. 3.114_4^{699}	163
3293	CsI_3	513.606	R.	207.5		
3294	$CsIO_3$	307.742	M.		4.85	
3295	$CsIO_4$	323.742	R		4.259	
3296	$CsICl_2$	330.658	R.	230	3.86	
3297	$CsIBr_2$	419.574		248		
3298	CsI_2Br	466.590		195.5		
3299	$CsIBrCl$	375.116		235		
3300	Cs_2S_2	329.750		460		
3301	Cs_2S_3	361.815		217		

Index No.	Formula	Mol. wt.	Crystal system	M. P.	$d_4^{t^\circ}$	Ref. ind. finding No.
3302	Cs_2S_4	393.880		160		
3303	Cs_2S_5	425.945		210	2.806^{18}	
3304	Cs_2S_6	458.010		186		
3305	Cs_2SO_4	361.685	R.	Tr. 660 to H. 1010	4.243 l 3.034_4^{1040}	687
3306	$CsHSO_4$	229.883	R.	d.	3.352^{16}	
3307	Cs_2SeO_4	408.820	R			752
3308	$Cs_2(SeO_4)_2$	552.020	R		4.453	
3309	CsN_3	174.834		315		
3310	$CsNO_3$	194.818	H	Tr. 161 to C. 414	3.685 l 2.713_4^{90}	
3311	$CsNH_2$	148.833		260		
3312	$CsNO_3.HNO_3$	257.834		100		
3313	$CsNO_3.2HNO_3$	320.849		35		
3314	$CsHC_8H_4O_4$—Phthalate	297.849	R		2.178	
3315	$CsH(CCl_3CO_2)_2$	458.566	M		2.143	
3316	Cs_2SiF_6	407.680			3.372^{17}	
3317	$CsGa(SO_4)_2.12H_2O$	610.845	C.		2.113	84
3318	$Cs_2InCl_5.H_2O$	575.725			3.350	
3319	$Cs_2InBr_5.H_2O$	798.015			3.776	
3320	$CsIn(SO_4)_2.12H_2O$	655.925	C.		2.241	85
3321	$Cs_2TlCl_5.H_2O$	665.325			3.879	
3322	$Cs_3Tl_2Cl_9$	1126.35	H.			361
3323	$Cs_2Zn(SO_4)_2.6H_2O$	631.222	M.		2.875	552
3324	$Cs_2Zn(SeO_4)_2.6H_2O$	725.492	M.		3.115	640
3325	$Cs_2Cd(SO_4)_2.6H_2O$	678.252	M		2.957	536
3326	$CsCd(CNS)_3$	419.139		213		
3327	$CsCl.HgCl_2$	439.794	C R.			164
3328	Cs_2HgI_4	973.958	M.		4.806	
3329	$Cs_2Hg_3I_8$	1882.91	M.		5.14	
3330	Cs_3HgI_5	1233.70	R.		4.605	
3331	$Cs_2Cu(SO_4)_2.6H_2O$	629.412	M.		2.858	559
3332	$2CsNO_2.AgNO_2.Bi(NO_2)_3$	858.548			3.88^{16}	
3333	$CsSO_4.Ir_2(SO_4)_3.24H_2O$	1335.64	C.	110		
3334	$CsRh(SO_4)_2.12H_2O$	644.035	C	111		112
3335	$CsMnO_4$	251.740			$3.597^{10.3}$	
3336	$CsMn(SO_4)_2.12H_2O$	596.055	C.			200
3337	$Cs_2Mn(SO_4)_2.6H_2O$	620.772	M.		2.740	524
3338	$CsFeCl_3.2H_2O$	331.055			2.907^{17}	
3339	$Cs_2FeCl_4.2H_2O$	499.323			3.275	
3340	$CsFe(SO_4)_2.12H_2O$	596.965	C.		2.061	100
3341	$Cs_2Fe(SO_4)_2.6H_2O$	621.682	M.		2.796	550
3342	$Cs_2FeSe_2O_8.6H_2O$	715.952	M.		3.694	
3343	$Cs_2SeO_4.Fe_2(SeO_4)_3.24H_2O$	1382.47	C.	60	3.618^{16}	116
3344	$Cs_2Co(SO_4)_2.6H_2O$	624.812	M.		2.841	566
3345	$Cs_2Co(C_3H_2O_4)_2.4H_2O$—Malonate	600.682			2.682	
3346	$Cs_2Ni(SO_4)_2.6H_2O$	624.532	M.		2.872	575
3347	$CsCr(SO_4)_2.12H_2O$	593.135	C.	116	2.043	94
3348	$CsV(SO_4)_2.12H_2O$	592.085			2.033^{4}	
3349	$3CsF.AlF_3$	539.390		823		
3350	$Cs_2SO_4.Al_2(SO_4)_3.24H_2O$	1136.17	C.		1.867^{0}	80
3351	$2Cs_2O.2Al_2O_3.9SiO_2.H_2O$—Pollucite	1325.64	C.		2.9	126
3352	$Cs_2La(NO_3)_5.2H_2O$	750.601	M.		2.827^{0}	
3353	$Cs_2Mg(SO_4)_2.6H_2O$	590.162	M.		2.676	488
3354	$Cs_2Mg(SeO_4)_2.6H_2O$	684.432	M.		2.94	583
3355	$Cs_2Mg(CrO_4)_2.6H_2O$	630.052	M.		2.747	821
3356	$Cs_3Cu_2Sr(SCN)_7$	1019.69	Tet.		2.882	374
3357	$Cs_3Cu_2Ba(SCN)_7$	1069.45	Tet.		2.92	365
3358	$Cs_3BaAg_2(SCN)_7$	1158.07	Tet.		3.026	360
3359	$CsLiCl_2$	210.665		356.5		

BOILING POINTS

General index No	Boiling point under 1 atm. (or mm of Hg indicated by superscript)
1	100
2	152 1
4	19 4
6	$9\ 9^{11}$
7	$3\ 8^{66}$
8	82
9	− 85 0
13	16^{15}
17	− 67 0
21	40^{40}
23	13_5
26	$-\ 35\ 5^{461}$
31	s. 110
34	97
35	ca 97
36	ca 77 diss s. 101^{1681}
37	ca. 116
38	− 10 0
39	44 6
40	s. 10
41	− 59 6
42	$74\ _5$
44	60^{40}
46	290
47	16_7
53	− 30
54	− 52
55	59
57	138
58	78 8
59	69 1
60	153^{66}
62	$151.{}_5^{765}$
63	$54^{0\ 18}$
64	68^{40}
65	115 d.
66	s. 317
67	− 41.2
68	− 42
72	100
73	s. − 39
74	d. 288
76	176 4
77	22_7
81	183
82	s. 4_{50}
84	− 1 8
87	− 35 5
88	324

General index No	Boiling point under 1 atm. (or mm of Hg indicated by superscript)
89	411
91	339
92	42_1
95	151 0
96	21 3
97	− 89 5
98	3 5
99	4_7
101	$42\ _5$
102	$-\ 33\ 3_5$
103	113 5
104	$118\ 5^{739.5}$
105	37
109	86
111	$56\ _5$
114	diss 4_0^{11}
118	d 210
120	s ca. 140
125	− 56
126	− 63 5
128	s. 105
129	<71
	exp 93
130	− 5 5
131	5
132	s. 520
139	d. <100
140	exp. 240
141	− 2
142	ca. 32
143	s. 542 235 vac
148	s. 55_1 220 vac
149	d. 15
164	s. 135
165	357.3
166	s 120
170	490
172	d. 160
177	s. 1_{40}
181	s. 80 d.
186	d.> − 13
191	90^{300}
192	s ca. 180
193	s. 347 (α) 600 (β)
195	− 87.4
197	$57.{}_5^{735}$
198	s. 2_{80} d.

General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)
204	− 95
205	− 75
206	− 40
207	73 5
208	16_2
209	180
210	107 23
211	21_2
213	− 8
214	172 9
215	10_6
216	193
217	s. $38\ 8^{794}$
218	137 6
219	ca. 165
222	s. $61\ 8^{708}$
223	490
224	51_4
226	$407\ _5$
227	523
228	515
230	295
232	125
233	ca. 118
235	205 s. d.
237	150 d.
238	95^{60}
250	127^{13}
251	328 5
252	22_4^{13}
253	26_2^{13}
254	25_7^{13}
255	29_1^{13}
256	s. $150^{vac.}$
263	−55
264	63^{752}
265	− 53
266	122
268	221
269	40_8
271	565
272	707
274	ca. 300 d.
282	− 17
284	$149\ _5$
285	390
286	220 2
287	92^{30}
291	28_0
292	$400.{}_6$

General index No.	Boiling point under 1 atm. (or mm of Hg indicated by superscript)
294	d. <260
316	4_{47}
320	45_3
322	5_{00} d.
337	−192.0
338	s. − 78.5
339	6 3
341	22_{30}
345	−112.0
346	− 15
347	53
348	80
349	− 15 2
350	$-\ 65^{1801}$
351	− 80 2
352	57 57
353	139
356	213
357	15_0^{15}
358	190^{15}
360	137 0
361	200
362	15_3
363	ca. 300
364	− 30
365	8
366	33
367	153
368	ca. 240
371	2
372	66
373	109
374	0^{45}
376	80
377	10_4
378	$140.{}_5$
379	290
381	220
382	$113\ _5$
383	172
384	23_5
385	192
386	$230\ _5$
387	255
388	s. 940^{20}
389	$92^{18.3}$
390	96
391	$150^{18.3}$
403	s. 221_0 diss.
404	31

No.	B. P.	No.	B. P.	No.	B. P.	No.	B. P.
406	27	488	114 1	716	430	1515	78.6
407	63.5	490	620	749	732	1534	973
408	107	491	202	752	650	1552	136.7
409	96 2	492	50^{40}	753	624	1556	78 d.
410	90	493	65^{40}	755	s 1185	1575	43^{751}
411	$134^{752\ 9}$	494	65^{30}	760	d. 280	1593	>1300
412	122	495	720	769	500	1597	176
413	115 5	496	340	770	d. 271	1610	d. 175
414	108	497	191 d	779	1100	1619	3800
415	142	499	1230	797	46	1624	340
416	139 5	508	180	798	118	1646	35
417	132	513	78	799	160	1647	s. 270
418	153 7	514	146	800	220	1648	180
419	171	515	181	825	970	1649	268
420	172 5	517	> 420	829	963	1658	170 d.
421	191	518	270 d.	832	713	1664	35 (in H_2)
422	187	519	240	845	132	1672	19 5
423	205^{756}	520	210	870	105	1673	187
425	$114\ 3^{756}$	521	224	881	650	1674	275.6
426	122	522	170	882	383 7	1675	346 7
427	154	523	231	883	304	1676	266
428	153	528	1290	893	s. 345	1677	227 5
429	227	529	950	894	322	1678	333
432	195^{20}	530	exp 105	896	310 d.	1679	327
435	$100\ 5^{765\ 7}$	543	916		s. 140	1689	6000
436	125	548	954	898	354	1690	6000
437	130	600	s. 475	901	s. 580	1706	$69^{sat.}$
438	$149^{754\ 3}$	619	110	915	d. 150		s. 56
439	141 5	621	130^{761}	918	96	1714	118
440	154 5	622	53^{14}	919	159	1724	4100
441	$201\ 5^{739\ 4}$	623	152^{755}	920	191	1747	111 2
442	107^{18}	624	$70\ 5^{18}$	921	135^{90}	1749	480
443	230	625	$64\ 5^{14}$	922	> 306 d.	1752	$148\ 5^{744}$
444	314 2	626	166^{769}	939	1366	1753	127
449	284	627	78^{13}	940	993	1755	127.19
450	136 4	628	83^{14}	947	1345	1758	130
451	230	629	70^{17}	951	1290	1767	3900
452	154	630	$99\ 5^{18}$	958	d. 400	1796	219
454	>360	631	105^{13}	974	170 d.	1797	240.5
459	140	632	96^{13}	1032	240 d.	1798	s. 400
460	138	633	$108\ 2^{18}$	1059	1550	1799	4300
461	4300	634	123^{14}	1075	444 d.	1802	229.5
465	− 90	635	124^{13}	1129	s. 265	1803	242
466	29	636	121^{15}	1147	134	1804	320
467	110 5	637	$144\ 5^{13}$	1148	203	1805	5500
468	86 5	670	s. 610	1149	47 3	1810	87.5
469	72		725	1180	s. 240	1811	17
470	185 9	675	5000	1234	$100\ 8^{183}$	1812	d. 200
471	375	678	535	1268	1190	1813	−101
472	163 5	679	217	1334	s. 1200 diss.	1814	12.5
480	416	693	139 diss.	1342	315	1815	90 6
481	5100	695	300	1397	102.8^{749}	1817	210
485 5	− 52	696	806	1447	1049	1819	$1230^{9\ 4}$
486	705	700	815	1509	d. 52	1821	> 3500
487	623	703	824	1513	240	1822	110

No.	B. P.	No.	B. P.	No.	B. P.	No.	B. P.
1823	95	2010	d. 100	2500	1560	2921	1416
1824	65	2044	d. 100	2601*		2924	1380
1825	120	2105	590	2604	1670	2926	1330
1826	175	2112	188	2605	1353	2927	d. 225
1827	212	2113	245	2606	d. 270	2931	d. 215
1828	255	2114	270	2608	d. 410	2932	d. 180
1858	2210	2115	331	2610	1265	2936	d. 850
1864	182.7^{761}	2116	330	2613	1190	2958	d. 350
	s 177.8	2117	341	2625	d. > 170	2959	d. 400
1865	268	2118	239^{19}	2668	1390	3196	1410
1866	d. 7	2131	1412	2670	1700	3197	1390
1869	382	2232	2850	2671	1413	3200	1340
1870	s 1550 (in N_2)	2234	450 diss	2677	1390	3205	1300
1879	600 (in H_2)	2236	> 1600	2680	1300	3283	1250
1893	130	2244	718	2769	1496	3284	1290
1894	194	2285	s 898.6	2846	> 1400	3287,	1300
1895	315	2495	795 diss.	2917	1320	3292	1280
1953	4600	2499	1400	2918	1500		

* Hüttig, *93*, **141**: 133, 24

REFRACTIVE INDICES

A. LIQUIDS

Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D
1	436	$1.833_4^{20.3}$	18	45	1.429	34	625	$1.5035^{22.5}$	50	513	1.5201
2	97	1.193^{16}	19	1893	1.432^{12}	35	627	$1.5062^{23.1}$	51	628	1.5218^{18}
3	9	1.256	20	62	1.437^{14}	36	635	1.5081^{22}	52	58	1.527^{10}
4	195	$1.317^{17.6}$	21	111	$1.440^{23.5}$	37	623	1.5082^{21}	53	918	$1.5327^{22.2}$
5	17	1.325^{10}	22	59	1.444	38	636	1.5097	54	919	$1.5390^{23.8}$
6	102	$1.325^{18.5}$	23	339	1.454	39	637	1.5118^{21}	55	2644	1.548^{16}
7	95	1.330^{-90}	24	341	1.46	40	633	$1.5120^{21.4}$	56	55	1.557^{14}
8	1	1.333	25	210	$1.460^{25.1}$	41	631	1.5127^{25}	57	1147	1.56^{45}
9	426	1.368	26	1808	1.464	42	619	1.5128	58	287	1.601^{14}
10	41	1.374	27	26	1.466^{12}	43	621	1.5132^{19}	59	450	$1.61^{10.5}$
11	1825	1.381	28	103	1.470^{22}	44	515	1.5143	60	2472	1.618
12	109	$1.397^{16.4}$	29	1894	$1.480^{6.5}$	45	2847	1.515	61	57	1.666^{14}
13	472	1.400	30	629	1.4926	46	624	$1.5158^{24.3}$	62	214	$1.697^{26.6}$
14	1827	1.408	31	634	1.5005	47	207	1.516^{14}	63	1317	1.700
15	38	1.410	32	626	$1.5021^{21.2}$	48	622	1.5174	64	63	1.736
16	2	1.414^{22}	33	632	1.5023	49	630	$1.5175^{19.7}$	65	42	1.885
17	1828	1.421									

B. SOLIDS

I. Isotropic Group. m. = mean value

Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D	Serial No.	Gen. index No.	Refractive index n_D
66	2670	1.336	95	3107	1.4814	127	2839	1.5305	160	260	1.7550
67	2913	1.339	96	3265	1.4815	128	3150	1.5329	161	1911	1.780
68	398	1.370	97	3084	1.4817	129	2671	1.5442	162	562	1.782
68.1	3143.6	1.403	98	3259	1.4823	130	1241	1.548	163	3292	1.7876
68.2	3017.6	1.408	99	2870	1.483	131	1451	1.55 (m.)	164	3327	1.792
69	344	1.41	100	3340	1.4839	132	1536	1.55 (m.)	165	1923	1.800
70	3032	1.4115	101	1613	1.4842	133	3200	1.5530	166	1928	1.801
70.1	2099.6	1.426	102	1369	1.4854	134	2924	1.5590	167	1921	1.811
70.2	478.5	1.433	103	2921	1.4903	135	2458	1.5667	168	2232	1.83
71	2235	1.4339	104	3197	1.493	136	1576	1.57	169	2282	1.83
72	2855	1.4388	105	2873	1.495	137	2531	1.5717	170	2364	1.838
73	2596	1.444	106	2902	1.496	138	2679	1.5943	171	1261	1.862?
74	2732	1.452	107	1910	1.4976	139	1187	1.6000	172	945	1.864 (m.)
75	1897	1.454	108	2872	1.50	140	2438	<1.6	173	939	1.93
76	2700	1.454	109	3253	1.5004	141	2394	1.608	174	278	2.0
77	3133	1.4562	109.5	2835	1.501	142	1383	1.61	175	402	2.05
78	3268	1.4566	110	743	1.5066	143	1576	1.61	176	1048	2.05
79	2760	1.457	111	3261	1.5070^{18}	144	3284	1.6418	177	1059	2.0710
80	3350	1.4587	112	3334	1.5077	145	132	1.642	178	280	2.087
81	1882	1.4594	113	2887	1.508	146	3205	1.6474	179	581	2.09?
82	344	1.46	114	3137	1.509	147	3019	1.6574	180	1258	2.16
83	3242	1.4638	115	1240	1.5103	148	2267	1.660 (m.)	181	1639	2.16
84	3317	1.4649	116	3343	1.5116^{18}	149	2401	1.67	182	668	2.20
85	3320	1.4652	117	2137	1.514	150	2926	1.6770	183	1123	2.20
86	3025	1.4653	118	2886	1.5144	151	3141	1.69	184	2333	2.20
87	3239	1.4658	119	2674	1.5151	152	3287	1.6984	185	1062	2.253
88	690	1.4664	120	2236	1.52	153	148	1.7031	186	951	2.346
89	680	1.4684	121	3047	1.522 (m.)	154	2225	1.705	187	756	2.3682
90	2740	1.4693	122	1633	1.5228	155	2392	1.710	188	936	2.705
91	2332	1.4736	123	2842	1.5230	156	2222	1.723			
92	2899	1.48	124	1422	1.5236	157	2415	1.735	188.1		2.89
93	3135	1.4801	125	3098	1.54 (m.)	158	2128	1.7364	188.2		3.56
94	3347	1.4810	126	3351	5.521	159	1145	1.74 (m.)	189	552	3.912

MISCELLANEOUS

Serial No.	Gen. index No.	Refractive index n	Serial No.	Gen. index No.	Refractive index n	Serial No.	Gen. index No.	Refractive index n	Serial No.	Gen. index No.	Refractive index n
190	367	1.579$^{15.5}$ (F)	193	232	1.563^{11} (C)	196	1274	2.69 (Li)	199	3236	1.46 (red)
191	266	1.621^{14} (F)	194	2196	2.35 (Li)	197	1273	2.70 (Li)	200	3336	1.48 (red)
192	352	1.412 (C)	195	890	2.49 (Li)	198	1053	>2.72 (Li)	201	1528	2.18 (red)

II. Uniaxial Group

Serial No.	Gen. Index No.	Refractive index		Serial No.	Gen. index No.	Refractive index	
		ω	ϵ			ω	ϵ
202	2778	1.300	1.296	247	2224	1.512	1.498
203	1	1.309	1.313	248	2866	1.518	1.522
204	2182	1.3439	1.3602	249	2422	1.522	1.513
205	2851	1.349	1.342	250	243	1.5246	1.4792
206	1323	1.3570	1.3742	251	2336	1.527	1.539
207	1409	1.3638	1.3848	252	764	1.5291	1.5039
208	2130	1.378	1.390	253	2453	1.5296	1.5252
209	814	1.3824	1.3992	254	3164	1.532	1.529
210	1583	1.3910	1.4066	255	1358	1.533	1.575
211	1047	1.4092	1.4080	256	1912	1.534	1.514
212	2237	1.417	1.393	257	2439	1.5364	1.4866
213	2347	1.436	1.478	258	3136	1.537	1.533
214	2713	1.4458	1.4524	259	3162	1.537	1.535
215	2941	1.455	1.515	260	1892	1.539	1.511
216	2735	1.4567	1.4662	261	2871	1.539	1.537
217	3216	1.4574	1.5078	262	1551	1.5393	1.5125
218	3173	1.4715	1.4721	263	2839	1.5398	1.5475
219	2107	1.4720	1.4395	264	2200	1.540	1.510
220	2119	1.473	1.435	265	2207	1.542	1.516
221	2412	1.475	1.486	266	2861	1.542	1.538
222	3185	1.481	1.461	267	342	1.544	1.553
223	1731	1.481	1.493	268	2659	1.545	
224	1970	1.482	1.473	269	2250	1.5496	
225	1995	1.482	1.474	270	1359	1.5519	1.5575
226	2018	1.486	1.479	270.5	2099.5	1.557	1.543
227	2031	1.487	1.479	271	2804	1.558	1.613
228	340	1.487	1.484	272	2129	1.559	1.580
229	2864	1.487	1.486	273	2226	1.56	
230	2493	1.487	1.496	274	1902	1.560	1.580
231	2397	1.49		274.5	475.5	1.563	1.552
232	2880	1.490	1.471	275	2199	1.565	
233	2086	1.490	1.480	276	2326	1.565	1.560
234	2054	1.490	1.481	277	2211	1.565	1.575
235	2072	1.490	1.482	278	2971	1.567	1.518
236	2869	1.490	1.502	279	2420	1.5690	1.6700
237	3181	1.4901	1.4996	280	1340	1.57	
238	1955	1.493	1.480	281	3134	1.572	1.592
239	2061	1.494	1.484	282	2357	1.575	1.57
240	2081	1.495	1.480	283	276	1.5766	1.5217
241	2403	1.496	1.491	284	2125	1.581	1.575
242	2436	1.4991	1.4758	285	1379	1.582	1.645
243	2329	1.507	1.468	286	1872	1.583	1.602
244	2968	1.5095	1.4684	287	2856	1.585	
245	2840	1.5095	1.5232	288	2705	1.5874	1.3361
246	1547	1.5109	1.4873	289	2188	1.5885	1.5970

Serial No.	Gen. index No.	Refractive index		Serial No.	Gen. index No.	Refractive index	
		ω	ε			ω	ε
290	3186	1.589	1.590	346	1994	1.717	1.817
291	3079	1.59		347	2100	1.719	1.733
292	1582	1.59	1.56	348	1951	1.721	1.816
293	3033	1.5906	1.5907	349	1259	1.723	1.681
294	2399	1.595	1.585	350	969	1.724	1.746
295	2417	1.597	1.560	351	3187	1.7278	1.7361
296	847	1.6038	1.6042	352	1025.1	1.730	1.810
297	2904	1.612	1.593	353	2621	1.735	1.435
298	1978	1.613	1.607	354	978	1.741	1.724
299	2314	1.6150	1.6360	355	1414	1.755	1.82
300	2393	1.617	1.652	356	2563	1.757	1.804
301	1400	1.6198	1.5922	357	2594	1.760	1.577
302	2572	1.621	1.619	358	733	1.768	1.812
303	1737	1.623	1.625	359	1858	1.773	1.773
304	2309	1.625		360	3358	1.7761	1.6788
305	2489	1.629	1.639	361	3322	1.784	1.774
306	1011	1.632	1.575	362	3065	1.7909	1.6527
307	2430	1.633	1.639	363	2201	1.80	
308	2275	1.634	1.631	364	1699	1.80	1.72
309	2273	1.634	1.632	365	3357	1.8013	1.6882
310	2307	1.635	1.631	366	1089	1.8036	1.7983
311	556	1.635	1.653	367	2189	1.815	1.761
312	3042	1.636	1.615	368	1307	1.817	1.5973
313	1934	1.640		369	794	1.818	1.618
314	2490	1.64		370	3085	1.820	1.715
315	2507	1.640	1.633	371	1364	1.82	1.73
316	1252	1.6430		372	1063	1.8466	1.9200
317	1739	1.643	1.623	373	1433	1.85	
318	2234	1.644	1.446	374	3356	1.8535	1.6982
319	1044	1.644	1.697	375	1507	1.855	1.60
320	1046	1.644	1.702	376	2358	1.870	1.792
321	2216	1.65	1.59	377	1394	1.875	1.633
322	2644	1.65	1.67	378	1415	1.875	1.784
324	2441	1.651	1.627	379	1431	1.88	
325	1907	1.654	1.676	380	2339	1.913	1.923
326	2121	1.6542	1.6700	381	2366	1.918	1.934
327	1156	1.6576	1.6666	382	483	1.923	1.968
328	2285	1.6583	1.4864	383	1416	1.93	
329	1439	1.664	1.629	384	2339	1.945	1.971
330	2433	1.666	1.661	385	1324	1.96	
331	2274	1.667	1.666	386	1419	1.96	
332	2341	1.669	1.657	387	483	1.960	2.015
333	2410	1.669	1.658	388	2365	1.967	1.978
334	2537	1.669	1.665	389	569	1.970	1.936
335	2131	1.675	1.59	390	882	1.9733	2.6559
336	1084	1.6769	1.6294	391	485	1.997	2.093
337	2004	1.680	1.685	392	744	2.008	2.029
338	2597	1.681	1.668	393	310	2.01	1.82
339	2425	1.6817	1.5026	394	666	2.07	2.05
340	1914	1.694	1.641	395	657	2.09	1.94
341	812	1.694	1.723	396	658	2.114	2.140
342	2163	1.700	1.509	397	2957	2.12	2.00
343	2538	1.701	1.699	398	537	2.13	2.21
344	1324.1	1.704	1.679	399	587	2.135	2.118
345	2281	1.706	1.698	400	1064	2.21	2.22

Serial No	Gen. index No	Refractive index		Serial No.	Gen. index No.	Refractive index	
		ω	ε			ω	ε
401	1695	2.2085	2.182	407	445	2.554	2.493
402	2187	2.31	1.95	408	2354	2.58	2.43
403	1776	2.354	2.299	409	447	2.616	2.903
404	755	2.356	2.378	410	403	2.654	2.697
405	1325	2.481	2.210	411	901	2.854	3.201
406	835	2.506	2.529	412	1095	3.0877	2.7924

Miscellaneous

Serial No	Gen. index No	ω	ε	Serial No.	Gen. index No.	ω	ε
413	1522	1.3817 (C)	1.3872 (C)	420	1413	2.45 (Li)	2.51 (Li)
414	2035.1	2.005 (667)	2.004 (667)	421	1264	2.46 (Li)	2.15 (Li)
415	1957.1		2.013 (667)	422	1094	2.6 (Li)	
416	2002.1	2.019 (667)	2.007 (667)	423	524	2.665 (Li)	2.535 (Li)
417	526	2.3 (Li)		424	1334	3.01 (Li)	2.94 (Li)
418	538	2.35 (Li)	2.33 (Li)	425	1098	3.084 (Li)	2.881 (Li)
419	1668	2.402 (Li)	2.304 (Li)	426	2471	1.683 (red)	1.587 (red)

III. Biaxial Group

Serial No	Gen index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
427	2852		1.364		462	1876	1.462	1.470	1.471
428	2694	1.394	1.396	1.398	463	343	1.469	1.47	1.473
429	2897		1.413		464	2150	1.4716	1.4730	1.4786
430	2898	1.407	1.414	1.415	465	2729	1.4653	1.4738	1.4804
431	2753	1.405	1.425	1.440	466	2691	1.464	1.474	1.485
432	2718	1.4193	1.4309	1.4493	467	3146	1.466	1.475	1.494
433	2724	1.4321	1.4361	1.4373	468	1874	1.474	1.476	1.483
434	2693		1.44		469	2617	1.460	1.477	1.488
435	3189	1.438	1.44	1.452	470	2398	1.461	1.478	1.485
436	2733	1.439	1.441	1.469	471	1356	1.4713	1.4782	1.4856
437	2723	1.4412	1.4424	1.4526	472	2948	1.475	1.480	1.487
438	2721		1.4434		473	2223	1.476	1.480	1.483
439	411	1.4368	1.4458	1.4510	474	3255	1.4767	1.4807	1.4907
440	2964	1.447	1.448	1.459	475	2708	1.391	1.481	1.486
441	2739	1.4453	1.4496	1.4513	476	2978		1.482	
442	3133	1.430	1.452	1.458	477	1918	1.478	1.482	1.482
443	2710	1.440	1.452	1.453	478	2862	1.480	1.482	1.493
444	2717	1.4499	1.4525	1.4604	479	3083	1.4759	1.4821	1.4969
445	2395	1.448	1.454	1.456	480	2715	1.4777	1.4822	1.5036
446	2890	1.435	1.455	1.459	481	1463	1.477	1.483	1.489
447	2145	1.4326	1.4554	1.4609	482	3029	1.4775	1.4833	1.4969
448	1809	1.340	1.456	1.459	483	2970	1.4768	1.4843	1.4870
449	2854	1.432	1.457	1.458	484	1289	1.4801	1.4840	1.4913
450	2720	1.4401	1.4629	1.4815	485	3247	1.4798	1.4848	1.4948
451	3149	1.4607	1.4629	1.4755	486	2977	1.440	1.485	1.550
452	2757		1.464		487	2719	1.4557	1.4852	1.4873
453	1871	1.459	1.464	1.470	488	3353	1.4857	1.4858	1.4916
454	2727	1.4599	1.4645	1.4649	489	138		1.486	
455	2616		1.465		490	760	1.4620	1.4860	1.4897
456	2738	1.4622	1.4658	1.4782	491	3043	1.4836	1.4864	1.5020
457	2743	1.4649	1.4663	1.4791	492	3091	1.4807	1.4865	1.5004
458	2943	1.4609	1.4669	1.5657	493	3148	1.483	1.487	1.490
459	2165	1.456	1.468	1.507	494	2853	1.484	1.487	1.496
460	2848	1.4468	1.4686	1.4715	495	3258	1.4815	1.4874	1.4977
461	3273	1.4672	1.4689	1.4779	496	3231		1.488	

Serial No.	Gen. index No.	Refractive index		
		α	β	γ
497	2882	1.485	1.488	1.489
498	2881	1.486	1.488	1.489
499	3245	1.4833	1.4884	1.4975
500	854	1.4847	1.4887	1.4959
501	1548	1.4669	1.4888	1.4921
502	3217	1.4812	1.4888	1.5719
503	2147	1.4856	1.4892	1.4911
504	2725	1.4855	1.4897	1.5041
505	1924		1.49	
506	2912		1.490	
507	1863	1.473	1.490	1.511
508	2950	1.479	1.490	1.526
509	2408	1.484	1.49	1.495
510	3249	1.4886	1.4906	1.5036
511	2143		1.491	
512	2171		1.491	
513	1368	1.4870	1.4915	1.4989
514	3096	1.4836	1.4916	1.5051
515	3262	1.4859	1.4916	1.5014
516	777	1.4888	1.4930	1.4994
517	3184	1.492	1.493	1.496
518	804		1.494	
519	2938	1.4935	1.4947	1.4973
520	2697	1.4820	1.4953	1.5185
521	1491	1.4902	1.4953	1.5032
522	2157	1.495	1.496	1.504
523	3264	1.4895	1.4961	1.5052
524	3337	1.4946	1.4966	1.5025
525	1716		1.4967	
526	2259	1.465	1.498	1.504
527	2771	1.495	1.498	1.499
528	2407	1.498	1.499	1.505
529	3152	1.4969	1.4991	1.5139
530	1361		1.500	
531	2901		1.5	
532	3014		1.500	
533	2638	1.40	1.50	
534	2709	1.418	1.500	1.543
535	806	1.480	1.500	1.530
536	3325	1.498	1.500	1.506
537	2108	1.4664	1.5007	1.5027
538	992	1.4910	1.5007	1.5054
539	1557	1.4949	1.5007	1.5081
540	2413		1.501	
541	2930		1.501	
542	2164	1.495	1.501	1.526
543	179	1.4981	1.5016	1.5866
544	2498	1.4710	1.5017	*ca β*
545	2180	1.490	1.502	1.511
546	2737	1.4794	1.5021	1.5265
547	2371	1.499	1.503	1.538
548	2396	1.501	1.503	1.510
549	3274	1.5011	1.5031	1.5135
550	3341	1.5003	1.5035	1.5094
551	2896	1.491	1.504	1.520
552	3323	1.5022	1.5048	1.5093
553	3151	1.494	1.505	1.516
554	2469	1.497	1.505	1.509
555	2900	1.505	1.505	1.506
556	2959	1.3346	1.5056	1.5064
557	2178		1.506	
558	2148	1.344	1.506	1.506
559	3331	1.5048	1.5081	1.5153
560	1986		1.507	
561	2299	1.493	1.507	1.545
562	2132	1.495	1.507	1.528
563	2765		1.5073	
564	2696	1.4886	1.5079	1.5360
565	2868	1.504	1.508	1.545
566	3344	1.5057	1.5085	1.5132
567	2893	1.5043	1.5093	1.5751
568	2151	1.5070	1.5093	1.5169
569	3230		1.510	
570	2383	1.495	1.51	1.520
571	2777	1.500	1.510	1.515
572	2106	1.502	1.510	1.512
573	2663	1.504	1.510	1.516
574	2772		1.511	
575	3346	1.5087	1.5129	1.5162
576	3215	1.5131	1.5133	1.5144
577	2289	1.510	1.514	1.578
578	2317	1.512	1.514	1.515
579	2022	1.440	1.515	1.525
580	2894	1.4135	1.5156	1.5233
581	3159	1.500	1.5170	1.5183
582	2551	1.500	1.517	1.525
583	3354	1.5178	1.5179	1.5236
584	2553		1.518	
585	2153	1.514	1.518	1.533
586	2264	1.515	1.518	1.525
587	1875	1.516	1.518	1.533
588	3031	1.5121	1.5181	1.5335
589	3092	1.5135	1.5195	1.5358
590	2228		1.52	
591	3158		1.52	
592	2998	1.48	1.52	1.55
593	2477	1.500	1.520	1.580
594	3221	1.51	1.52	1.524
595	2154	1.510	1.520	1.543
596	2860	1.516	1.52	1.520
597	2466	1.484	1.521	1.538
598	3246	1.5162	1.5222	1.5331
599	1466		1.5225	1.5227
600	2249	1.5205	1.5226	1.5296
601	3176		1.523	
602	174	1.5209	1.5230	1.5330
603	3045	1.5096	1.5235	1.5387
604	2758	1.407	1.524	1.541
605	2405	1.513	1.524	1.525
606	3139	1.518	1.524	1.526

Serial No.	Gen. index No.	Refractive index		
		α	β	γ
607	3111	1 5221	1 5244	1 5373
608	3007	1 5199	1 5248	1 5339
609	2294	1 470	1 525	1 555
610	2097		1 526	
611	3157	1 508	1.526	1 550
612	1370	1 5201	1 5260	1 5356
613	3138	1 522	1 526	1 530
614	2641		1 529	
615	2865	1 525	1 529	1 536
616	2807	1 5193	1 5295	1 5436
617	2985	1 417	1 530	1 533
618	2304	1 515	1 530	1 580
619	1762	1 518	1 530	1 542
620	778	1 5240	1 5300	1 5385
621	2280	1 525	1 53	1 550
622	2167	1 527	1 530	1 540
623	1497	1 5246	1 5311	1 5396
624	2969	1 4893	1 5314	1 5363
625	2889	1 515	1 532	1 536
626	2197	1 527	1 532	1 583
627	2566		1 533	
628	2759		1 533	
629	2190		1 533	1 5769
630	2166	1 489	1 534	1 557
631	2432	1 517	1 534	1 565
632	1861	1 5347	1 5347	1 5577
633	2286	1 460	1 535	1 545
634	3015	1 495	1 535	
635	2382	1 500	1 535	1 560
636	2302	1 515	1 535	1 575
637	2142	1 523	1 535	1 586
638	2295	1 525	1 535 ?	1 550
639	993	1 5213	1 5355	1 5395
640	3324	1 5326	1 5362	1 5412
641	961	1 5140	1 5368	1 5433
642	1355	1 528	1 537	1 543
643	1558	1 5291	1 5372	1 5406
644	2404		1 539	
645	3004		1 539	
646	2955	1 5352	1 5390	1 5446
647	2179		1 54	
648	2293	1 460	1 540	1 610
649	2218	1 520	1 54	1 545
650	2217	1 527	1 540	1 544
651	1512		1 542	
652	1030	1 413	1 542	1 557
653	2859	1 466	1 542	1 596
654	1363	1 530	1 543	1 595
655	2981	1 415	1 545	1 565
656	2265	1 539	1 545	1.551
657	2878	1 545	1 546	1.551
658	2036	1 5392	1.5479	1 5592
659	2558	1 542	1 548	*ca.* 1 548
660	2198	1 544	1 548	1.572
661	1950	1.5433	1.5490	1.5755
662	2592	1 538	1 549	1.554
663	2014	1.5399	1.5494	1.5607
664	1886		1 55	
665	2204	1 5211	1 5500	1 5680
666	2212	1 53	1.55	1 55
667	1032	1 545	1.55	
668	2029	1 5413	1 5505	1.5621
669	3074	1 5498	1 5513	1 5634
670	2046	1 5427	1 5519	1 5629
671	3276		1 552	
672	2736	1.5382	1 5535	1 5607
673	3220	1.5515	1 5537	1 5582
674	2288	1.491	1 555	1 650
675	1360	1 533	1 555	1 635
676	2292	1 545	1 555	1 575
677	1927	1.551	1 555	1.562
678	3086		1 556	
679	2876	1 5520	1.5579	1.5608
680	1884	1 551	1 558	1.582
681	1925	1 554	1 558	1.573
682	2637	1 530	1 560	1 590 ?
683	2296	1 55	1 56	1.57
684	2618	1 5487	1 5602	1.5788
685	3165	1 548	1 562	1.567
686	188	1 5607	1 5630	1.5846
687	3305	1.5598	1 5644	1 5662
688	838		1 565	
689	2780	1 560	1 565	1.574
690	1901	1 561	1 565	1 567
691	3034		1 565	1 608
692	1860	1 566	1 566	1 587
693	2642		1 567	
694	2634	1 428	1 567	1 572
695	2298	1 450	1 567	1 600
696	2774	1 536	1 567	1 649
697	3002	1.527	1 568	1 647
698	2268	1 565	1 568	1 580
699	3087	1 5660	1 5689	1 5831
700	2877	1 565	1 569	1 569
701	2156	1 569	1 570	1 582
702	2159	1 563	1 571	1 596
703	2158	1.555	1 572	1 575
704	2464	1 559	1 574	1 598
705	2369	1.56	1 574	1 580
706	2290	1.495	1 575	1 640
707	2368	1 553	1 575	1 577
708	2248	1 5693	1 5752	1 6130
709	3063	1 5438	1 5754	
710	643		1 576	
711	1889	1 562	1 576	1 588
712	1888	1 574	1 576	1.588
713	2504	1 5622	1 577	1 635
714	3089		1 5772	
715	2789	1 544	1 578	1.601
716	3057	1.569	1 579	1.669

Serial No.	Gen. index No.	Refractive index α	β	γ
717	2416	1.578	1.579	1.583
718	2359	1.5700	1.5818	1.5961
719	2370	1.560	1.582	1.587
720	782	1.574	1.582	1.582
721	2389		1.583	
722	3073		1.5837	
723	2400	1.576	1.584	1.588
724	1885	1.563	1.585	1.592
725	2803	1.508	1.586	1.525
726	2227	1.585	1.586	1.596
727	1903	1.552	1.588	1.600
728	2181	1.539	1.589	1.589
729	2591	1.584	1.589	1.594
730	2279	1.5825	1.5891	1.5937
731	3140	1.561	1.590	1.594
732	2327	1.586	1.59	1.598
733	2123	1.5595	1.5908	1.6311
734	781	1.572	1.591	1.59
735	2385	1.572	1.591	1.594
736	3056		1.592	
737	1738	1.582	1.592	1.592
738	2384	1.582	1.592	<1.606
739	2381	1.5863	1.5920	1.6139
740	2658	1.579	1.593	1.597
741	2798	1.5889	1.5943	1.7163
742	1276	1.562	1.595	1.632
743	2903	1.571	1.595	1.598
744	2523	1.5860	1.5951	1.6072
745	2546	1.573	1.597	1.636
746	2388	1.586	1.598	1.605
747	2775	1.573	1.599	1.657
748	1987	1.5989	1.5999	1.6003
749	2664		1.6	
750	2867		1.60	
751	2322	1.595	1.60	1.603
752	3307	1.599	1.600	1.600
753	3179	1.5883	1.6007	1.6316
754	2291	1.413	1.602	1.611
755	786	1.586	1.602	1.608
756	2278	1.590	1.602	1.638
757	1378	1.579	1.603	1.633
758	1935	1.586	1.603	1.623
759	2324	1.593	1.603	1.607
760	2857	1.594	1.603	1.615
761	2152	1.602	1.604	1.615
762	1357	1.51	1.605	1.611
763	2440	1.567	1.605	1.626
764	2122	1.591	1.605	1.614
765	2269		1.606	
766	2895	1.595	1.606	1.634
767	2555		1.607	
768	3003		1.607	
769	3052		1.6071	
770	3001	1.571	1.608	1.694
771	820	1.617	1.609	1.593
772	2321	1.605	1.61	1.612
773	2315	1.610	1.611	1.654
774	2421	1.592	1.612	1.621
775	2559	1.597	1.612	1.621
776	2335	1.609	1.6125	1.619
777	2173	1.520	1.613	1.639
778	2356	1.602	1.613	1.649
779	1913	1.588	1.617	1.655
780	813	1.614	1.617	1.636
781	2184	1.607	1.619	1.639
782	1915	1.61	1.62	1.65
783	1043	1.61	1.62	1.71
784	1905	1.619	1.620	1.627
785	2419	1.620	1.620	1.654
786	2429	1.609	1.623	1.635
787	2583	1.610	1.623	1.623
788	2367	1.621	1.623	1.631
789	2451	1.6220	1.6237	1.6309
790	2185	1.617	1.624	1.652
791	809	1.531	1.625	1.659
792	1035	1.541	1.625	1.660
793	783	1.614	1.625	1.637
794	1382	1.615	1.625	1.665
795	2561	1.620	1.625	1.645
796	2411	1.616	1.626	1.640
797	2431	1.621	1.627	1.635
798	3178	1.6237	1.6278	2.2916
799	1514	1.532	1.628	1.665
800	2316	1.616	1.629	1.631
801	1920		1.63	
802	1721	1.585	1.630	1.630
803	1321	1.602	1.632	1.632
804	2230	1.603	1.632	1.639
805	3275	1.622	1.633	1.644
806	2386	1.632	1.634	1.636
807	2308		1.635	
808	1580	1.541	1.636	1.669
809	2767	1.577	1.636	1.639
810	3012	1.620	1.636	1.638
811	1185		1.637	
812	2470	1.453	1.637	1.707
813	2206	1.636	1.637	1.653
814	2640	1.507	1.638	1.698
815	1898	1.632	1.638	1.643
816	2521	1.6369	1.6381	1.6491
817	3068	1.545	1.641	1.760
818	2823	1.596	1.641	1.652
819	1900	1.638	1.642	1.653
820	2409	1.632	1.643	1.645
821	3355	1.637	1.643	1.655
822	2305	1.462	1.643	1.722
823	2349	1.636	1.644	1.654
824	2320	1.642	1.645	1.654
825	2501	1.635	1.646	1.660
826	1929	1.643	1.649	1.649

Serial No.	Gen. index No.	Refractive index α	β	γ
827	2564		1 651	
828	2177	1 635	1 651	1 670
829	826		1 6513	
830	1916	1 612	1 652	1 675
831	2387	1 625	1 653	1 669
832	2176	1 650	1 653	1 658
833	2214	1 6527	1 6537	1 6748
834	2863		1 654	
835	1298	1 647	1 654	1 660
836	2175	1 651	1 654	1 660
837	1919	1 633	1 655	1 662
838	2391	1 643	1 655	1 663
839	2126	1 652	1 655	1 671
840	2790	1 6491	1 6555	1 7143
841	2379	1 540	1 656	1 682
842	1295	1 651	1 656	1 683
843	1297	1 652	1 656	1 660
844	1069	1 6272	1 6573	1 6601
845	1569	1 622	1 658	1 687
846	1296	1 63	1 66	1 69
847	2424	1 640	1 660	1 675
848	1439	1 655	1 66	1 670
849	2910	1 645	1 661	1 688
850	1505	1 6263	1 6614	1 6986
851	1585	1 629	1 662	1 727
852	2426	1 651	1 662	1 668
853	2163	1 5155	1 664	1 666
854	2660	1 660	1 666	1 676
855	2372	1 642	1 667	1 669
856	2215	1 662	1 667	1.673
857	1388	1 635	1 668	1 702
858	3064	1 626	1 6684	1 757
859	3005	1.485	1 669	1 697
860	757	1 658	1 669	1 670
861	2183		1 670	
862	2340		1 670	
863	2186	1 668	1 670	1 690
864	2427	1 664	1 671	1 694
865	1908	1 670	1 671	1 689
866	2858	1 634	1 673	1 685
867	2330	1 640	1 674	1 679
868	2353	1 662	1 674	1 676
869	2402	1 665	1 674	1 684
870	2905	1 666	1 674	1 688
871	2800	1 671	1 674	1 684
872	2557	1 673	1 674	1 678
873	1381	1 653	1 675	1 697
874	1389		1 676	
875	2542	1 529	1 676	1 677
876	1926	1 643	1 678	1 684
877	3037	1 648	1 678	1 699
878	2651	1 676	1 679	1 687
879	2741		1 6802	
880	2284	1 5299	1 6809	1 6854
881	792	1.662	1 683	1.717
882	2595	1.525	1.684	1.686
883	941		1.685	
884	2593	1.681	1.685	1 695
885	1005	1 67	1 686	1 698
886	1937	1.678	1 686	1 689
887	2809		1.687	
888	1184	1 687	1 687	1 704
889	1270 1	1.684	1 695	1.698
890	1406	1 672	1 697	1 717
891	1008	1 695	1 698	1 733
892	2815	1 6610	1 6994	1 7510
893	2810		1.70	
894	2565		1.702	
895	2652		1.702	
896	2418	1 700	1.702	1.706
897	1294	1 695	1 704	1.710
898	785	1 660	1 705	1 713
899	734		1.707	
900	2229	1 705	1.709	1 711
901	2428	1 708	1.711	1 718
902	2350	1 709	1 711	1.724
903	976	1.703	1 713	1 722
904	2556	1 614	1 714	1.729
905	2480	1 7146	1 7174	1 812
906	1720	1 691	1 720	1.720
907	1899	1 712	1 720	1 728
908	2318	1 715	1 720	1 737
909	2423	1 712	1 721	1 731
910	2351	1 686	1 722	1 735
911	1859	1.702	1.722	1 750
912	1012	1 694	1 726	1 730
913	2510	1 7129	1 7266	1.7441
914	1922	1 705	1 729	1 730
915	2417.1	1 724	1.729	1 734
916	972	1.710	1 731	1 732
917	1377	1 730	1 732	1.762
918	793	1 708	1 733	1 758
919	1670	1 720	1 733	1 935
920	807	1 640	1 736	1 750
921	964	1 730	1 737	1 785
922	2360	1.732	1 737	1 751
923	1841	1.617	1.738	1.776
924	3101	1 7202	1 7380	1 8197
925	1956	1 731	1 738	1 744
926	2208		1.74	
927	3100		1 74	
928	1408	1.71	1.74	1 76
929	1318	1 733	1.740	1 744
930	1930	1.736	1.741	1.746
931	1003		1 743	
932	997	1.702	1 745	1.789
933	2124	1.747	1 748	1 757
934	2484		1 749	
935	1726	1.72	1 75	1.80
936	1670	1.74	1 75	1.95

Serial No.	Gen. index No.	Refractive index			Serial No.	Gen. index No.	Refractive index		
		α	β	γ			α	β	γ
937	2781	1.743	1.754	1.764	985	2338	1.910	1.91	1.945
938	1028	1.730	1.758	1.838	986	261	1.871	1.92	2.01
939	967	1.708	1.760	1.798	987	1050	1.885	1.920	1.956
940	1000	1.719	1.762	1.805	988	3124	1.750	1.925	1.95
941	1387	1.765	1.774	1.797	989	1305	1.92	1.95	1.96
942	2573	1.770	1.774	1.783 ?	990	1365	1.702	1.955	1.965
943	2352	1.758	1.776	1.795	991	712	1.9493	1.9592	1.9640
944	966	1.730	1.778	1.803	992	663	1.947	1.961	1.968
945	1303	1.760	1.779	1.779	993	1722	1.955	1.985	2.05
946	1944	1.757	1.78	1.803	994	401		1.99	
947	2127	1.78	1.78	1.785	995	557	1.93	1.99	2.02
948	1045	1.752	1.782	1.815	996	660	1.87	2.00	2.01
949	1319	1.759	1.786	1.797	997	1723	1.90	2.00	2.05
950	1380	1.775	1.786	1.815	998	576		2.03	
951	1006	1.747	1.788	1.829	999	2219	1.908	2.05	2.065
952	1420	1.783	1.788	1.818	1000	573	2.042	2.050	2.050
953	1670	1.78	1.79	2.04	1001	617	1.8037	2.0763	2.0780
954	1300	1.780	1.793	1.802	1002	329		2.09	
955	2337		1.795		1003	2375	1.70	2.10	2.23
956	2808	1.763	1.799	1.813	1004	1326	2.08	2.1	2.16
957	735		1.80		1005	541	1.816	2.102	2.126 ?
958	1362	1.76	1.8	1.81	1006	539	2.0767	2.1161	2.1580
959	1301	1.783	1.801	1.834	1007	1696		2.15	
960	1007	1.79	1.807	1.84	1008	535	2.04	2.15	2.15
961	2376	1.775	1.815	1.825	1009	335	2.14	2.15	2.18
962	2582		1.816		1010	1421	2.12	2.17	2.31
963	583	1.74	1.82		1011	2374	1.77	2.18	2.35
964	1009	1.820	1.826	1.88	1012	473	2.13	2.19	2.20
965	2346	1.800	1.831	1.846	1013	1336	1.94	2.20	2.51
966	2802	1.750	1.832	1.832	1014	1327	2.10	2.20	2.31
967	1049	1.8090	1.8380	1.8593	1015	1391	2.19	2.20	2.33
968	999	1.69	1.84	1.85	1016	529	2.1992	2.2172	2.2596
969	1430	1.773	1.840	1.845	1017	1697	2.17	2.22	2.32
970	2363	1.825	1.842	1.857	1018	1671	2.09	2.24	2.26
971	2221	1.85	1.85	1.99	1019	1807	2.22	2.25	2.29
972	2220	1.85	1.85	2.02	1020	1784	2.17	2.26	2.32
973	639	1.789	1.852	1.877	1021	1781	2.18	2.27	2.35
974	2492		1.865		1022	536	2.24	2.27	2.31
975	707	1.8600	1.8671	1.8853	1023	1694	2.27	2.27	2.30
976	1010	1.73	1.870	1.91	1024	279	2.18	2.35	2.35
977	1027	1.655	1.875	1.909	1025	2331		2.38	
978	1407	1.835	1.877	1.886	1026	1335	2.26	2.39	2.40
979	1794	1.817	1.879	2.057	1027	878	2.37	2.5	2.65
980	1302	1.87	1.88	1.93	1028	446	2.583	2.586	2.741
981	553	1.8771	1.8823	1.8937	1029	917		3	
982	3010	1.527	1.903	1.952	1030	1096		3	
983	2334	1.900	1.907	2.034	1031	1101		3	
984	2361		1.91	1.91	1032	296	3.194	4.046	4.303

MISCELLANEOUS

1033	944	1.831	1.861 (green)	1.880	1037.1	3143.5	1.461		1.449
1034	429	1.3996		1.4102	1037.2	3017.5	1.466		1.455
1035	432	1.4057		1.4165	1038	3009	1.4676		1.620
1036	418	1.4248		1.4382	1039	1399	1.500		1.660
1037	2994	1.452		1.465	1040	2776	1.518		1.527

Serial No.	Gen. index No.	Refractive index α	β	γ
1041	2213	1.575		1.649
1042	2644	1.584		1.604
1043	2646	1.594		1.614
1044	*1322*	*1.62*		*1.63*
1045	*2348*	*1.6226*		*1.7643*
1046	2323	1.641		1.650
1047	2570	1.6704		
1048	2414	1.675		1.685
1049	2319	1.717		1.735
1050	1075	1.729		1.788
1051	2549			1.789
1052	2560	1.810		1.830
1053	716	1.817		
1054	582	1.90		1.97
1055	3081	1.553	1.555 (Li)	1.571
1056	82	2.00	2.18 (Li)	2.35
1057	2355	2.200	2.200 (Li)	2.290
1058	1263	2.24	2.24 (Li)	2.53
1059	599	2.30	2.35 (Li)	2.40
1060	1631	2.31	2.37 (Li)	2.66
1061	1412	2.38	2.39 (Li)	2.42
1062	1698		2.40 (Li)	
1063	1800		2.40 (Li)	
1064	1766	2.41	2.50 (Li)	2.51
1065	1661		2.55 (Li)	
1066	1093	2.48	2.58 (Li)	2.60
1067	271	2.46	2.59 (Li)	2.61
1068	525	2.51	2.61 (Li)	2.71
1069	1411		2.62 (Li)	
1070	887	2.35	2.64 (Li)	2.66
1071	272		>2.72 (Li)	
1072	723	>2.72	>2.72 (Li)	
1073	298	2.74(Li)		>2.72 (Li)
1074	2770		1.473 (red)	
1075	3177		1.5226 (red)	
1076	2524		1.532 (red)	
1077	3114		1.591 (red)	
1078	935		2.63 (red)	

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C-TABLE

[Compounds of carbon with elements having key-numbers below 16]

Acknowledgement is made to Prof E E Reid for advice in connection with nomenclature and for his reading of the manuscript of this ______

Gen. index No	Formula	Name cf Table, p 280	Molecular weight (I C T. atomic weights, r. p. 43)	Normal melting point. °C	Boiling point under 1 atm. (or mm of Hg indicated by superscript)	Specific gravity, 20°/4° (or at other indicated temperature)	Refractive index finding No, r Table, p 276
1	CBi_2O_5	Bismutospherite	510.00	d.		7.35	
1.1	$CBrClO$	Carbonyl bromochloride	143.37		25	1.82^{15}	
2	$CBrCl_3$	Bromotrichloromethane	198.29	−21	172	$1.959^{14.5}_{4}$	697
3	$CBrN$	Cyanogen bromide	105.92	52	61.6	2.015	
4	CBr_2O	Carbonyl bromide	187.83		64.5	2.44	
5	CBr_3NO_2	Bromopicrin	297.76	10.3	127^{118}	2.799	826
6	CBr_4	Carbon tetrabromide	331.66	α48.4 β90.1	189.5	3.42	
7	$CClN$	Cyanogen chloride	61.466	−6	13.8	1.186	
8	$CCl_2N_2O_4$	Dichlorodinitromethane $Cl_2C(NO_2)$	171.93	122.5			
9	CCl_2O	Carbonyl chloride (Phosgene)	98.916	−104	8.3	1.392	
10	CCl_2S	Thiophosgene	114.98		73.5	1.509^{15}	721
11	CCl_3NO_2	Chloropicrin Cl_3CNO_2	164.38	−64	112.4	1.692^{0}	470
12	CCl_4	Carbon tetrachloride	153.83	−23.0	76.8	1.595	476
13	CF_4	Carbon tetrafluoride	88.00	−80	−15		
14	CIN	Cyanogen iodide	152.94	146.5			
15	CIN_3O_6	Iodotrinitromethane $CI(NO_2)_3$	276.96	56			
16	CI_4	Carbon tetraiodide	519.73	d.		4.32	
17	CN_4O_8	Tetranitromethane $C(NO_2)_4$	196.03	13	125.7	1.650^{13}_{4}	364
17.1	COS	Carbonyl sulfide	61.065	−138	−48	1.24^{-87}	
17.2	$CSSe$	Carbon sulfoselenide	123.265		84.5		
17.3	CS_2	Carbon disulfide	76.130	−111.6	46.3	1.261^{22}_{20}	
17.4	$CHBrCl_2$	Bromodichloromethane	163.84		92	1.925^{15}	
18	$CHBr_3$	Bromoform	252.76	7.7	150.4	2.890	772
19	$CHCl_3$	Chloroform	119.38	−63.5	61.2	1.489	417
20	CHF_3	Fluoroform	70.008		$20^{40\ \text{at.}}$	2.53	
21	CHI_3	Iodoform	393.80	119		4.1	1189
22	CHN	Hydrocyanic acid HCN	27.016	−14	26	0.699	809
23	$CHNO$	Cyanic acid $HCNO$	43.016	d.		1.140^{0}	
24	$CHNS$	Thiocyanic acid $HCNS$	59.081	5	d.		
25	CHN_3O_6	Nitroform $CH(NO_2)_3$	151.032	15	> 100 d.		
26	CH_2Br_2	Methylene bromide	173.85	−52.8	97.8	2.46^{15}_{15}	
27	CH_2ClNO	Carbamyl chloride $ClCONH_2$	79.481	50	62		
28	CH_2Cl_2	Methylene chloride	84.931	−96.7	40.1	1.336	273
29	CH_2I_2	Methylene iodide	267.88	5.2; 5.7	180 d.	3.325	870
30	CH_2N_2	Cyanamide $CN.NH_2$	42.031	44	140^{19} d.	1.083	1073
31	CH_2N_2	Diazomethane $H_2C{:}N_2$	42.031	−145	−23		
32	$CH_2N_2O_3$	Methylnitrolic acid $O_2NCHNOH$	90.031	64			
33	$CH_2N_2O_4$	Dinitromethane $H_2C(NO_2)_2$	106.031	< −15	100 d.		
34	CH_2N_4	Tetrazole	70.047	155			
35	CH_2O	Formaldehyde $HCHO$	30.015	−92	−21	0.815^{-20}	
36	$(CH_2O)_x$	Paraformaldehyde	$(30.015)_x$	160			
37	CH_2O_2	Formic acid HCO_2H	46.015	8.4	100.5	1.220	25
38	CH_3AsCl_2	Methylarsine dichloride	160.90	−59	136	1.838	
39	CH_3AsO	Methylarsinous oxide	105.98	95			
40	CH_3Br	Methyl bromide	94.939	−93	4.6	1.732^{0}_{0}	
41	CH_3Cl	Methyl chloride	50.481	−97.6	−23.7	0.920^{18}	
42	CH_3ClO	Methyl hypochlorite CH_3OCl	66.481		13.4		
43	CH_3ClO_2S	Methylsulfone chloride	114.546		160	1.510	
44	CH_3F	Methyl fluoride	34.023		−78.0		
45	CH_3I	Methyl iodide	141.96	−66.1	42.6	2.279	696
46	CH_3NO	Formamide $HCONH_2$	45.031	−5	193	1.139	995
47	CH_3NO	Formaldoxime $H_2C{:}NOH$	45.031		84		
48	CH_3NO_2	Nitromethane CH_3NO_2	61.031	−29.2	101.9	1.139	43
49	CH_3NO_2	Methyl nitrite CH_3ONO	61.031		−12	0.991^{15}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
50	CH_3NO_3	Methyl nitrate CH_3ONO_2	77.031		exp. 65	1.217^{15}	
51	CH_3NS	Thioformamide $HCSNH_2$	61.096	29			
52	CH_3N_3	Methyl azide ..	57.047		21	0.869^{4}_{14}	
53	$CH_3N_3O_3$	Nitrourea $O_2NNHCONH_2$	105.05	150 d.			
54	CH_4	Methane.......	16.0308	-184	-161.4	0.415^{-164}	
55	CH_4N_2O	Urea H_2NCONH_2	60.047	132.7		1.335	1167
56	$CH_4N_2O_2$	Methylnitramine CH_3NHNO_2	76.047	38		$1.243^{15.6}_{4}$	1077
57	CH_4N_2S	Ammonium thiocyanate	76.112	149.6	d 160	1.305	
58	CH_4N_2S	Thiourea H_2NCSNH_2	76.112	182		1.405	
59	$CH_4N_4O_2$	Nitroguanidine $H_2NC(:NH)NHNO_2$	104.063	231			
60	CH_4O	Methyl alcohol CH_3OH	32.031	97.8	64.5	0.792	2
61	CH_4O_3S	Methylsulfonic acid CH_3SO_3H	96.096		167^{10}	1.481	
62	CH_4O_4S	Methyl sulfuric acid CH_3SO_4H	112.09	< -30			
63	CH_4S	Methylmercaptan CH_3SH ..	48.096	121.0	7.6	0.868	
64	CH_5As	Methylarsine CH_3AsH_2	91.999		2		
64.1	CH_5AsO_3	Methyl arsenate $CH_3AsO(OH)_2$	139.999	161			1234
65	CH_5N	Methylamine CH_3NH_2	31.047	92.5	-6.5	0.699^{-11}	
66	CH_5NO	*N*-Methylhydroxylamine CH_3NHOH	47.047	42	62.5^{15}	1.0003	226
67	CH_5NO_2	Ammonium formate HCO_2NH_4	63.047	116		1.266	
67.1	CH_5NO_3	Ammonium hydrogen carbonate	79.047	d		1.573	1223
68	CH_5N_3	Diazoaminomethane ..	59.063	-12	92 s d		
69	CH_5N_3O	Semicarbazide $H_2NCONHNH_2$	75.063	96			
70	$CH_5N_3O_4$	Urea nitrate $H_2NCONH_2.HNO_3$	123.06	153 d		1.664	
71	CH_5N_3S	Thiosemicarbazide $H_2NCSNHNH_2$.	91.128	183			
72	CH_5O_2P	Methylphosphinic acid $CH_3PO(OH)_2$	96.063	105			
73	CH_5P	Methylphosphine CH_3PH_2	48.063		-14		
74	CH_6ClN	Methylamine hydrochloride	67.512	226	230^{15}		
75	CH_6ClN_3	Guanidine hydrochloride	95.528				1333
76	CH_6ClN_3O	Semicarbazide hydrochloride	111.53	173 d.			
77	CH_6N_2	Methylhydrazine CH_3NHNH_2	46.062		87.5		
78	CH_6N_4	Methyltetrazane $CH_3NHN:NNH_2$	74.078		130		
79	$CH_6N_4O_2$	Guanidine nitrite $(NH_2)_2C(:NH).HNO_2$	106.08	78.5			
80	$CH_6N_4O_3$	Guanidine nitrate.......	122.079				1333
81	$CH_6N_4O_4$	Semicarbazide nitrate	138.08	123			
82	CH_7ClNH_4	Aminoguanidine hydrochloride	110.54	163			
83	C_2Br_2	Dibromoacetylene $BrC:CBr$	183.83		76	2	
84	$C_2Br_2Cl_2$	1, 2-Dibromo-1, 2-dichloroethylene	254.75	4.4	172	2.304^{15}_{4}	894
84.1	$C_2Br_2Cl_4$	1, 2-Dibromo-1, 1, 2, 2-tetrachloroethane	325.66			2.713	1308
85	$C_2Br_2O_2$	Oxalyl bromide $(COBr)_2$	215.83	-19.5	101.4		
86	C_2Br_4	Tetrabromoethylene $Br_2C:CBr_2$	343.66	57.5	227		
87	C_2Br_6	Hexabromoethane Br_3CCBr_3	503.50		210	3.823	1316
88	C_2Cl_2	Dichloroacetylene $ClC:CCl$	94.916	-50			
89	$C_2Cl_2O_2$	Oxalyl chloride $(COCl)_2$	126.916	-12	64	$1.488^{18.4}_{4}$	822
90	C_2Cl_4	Tetrachloroethylene $Cl_2C:CCl_2$	165.83	22.4	120.8	1.623	623
91	$C_2Cl_4O_2$	Trichloromethyl chloroformate	197.83	-57	127.5	1.653^{14}	
92	C_2Cl_6	Hexachloroethane Cl_3CCCl_3	236.75	185	185	2.091	
93	C_2I_2	Diiodoacetylene $IC:CI$. .	277.86	82			
94	C_2I_4	Tetraiodoethylene $I_2C:CI_2$	531.73	187		2.983	
95	C_2N_2	Cyanogen $CN.CN$ ...	52.016	-34.4	-20.5	$0.866^{17.2}$	
96	C_2N_2S	Cyanogen sulfide $(CN)_2S$	84.081	60			
97	$C_2N_4O_6$	Trinitroacetonitrile	176.03	41.5	exp. 220		
98	$C_2N_6O_{12}$	Hexanitroethane $(O_2N)_3CC(NO_2)_3$	300.05	142 d.			
99	C_2HBr	Bromoacetylene $BrC:CH$	104.924		-2		
100	C_2HBrCl_2	1, 2-Dichloro-1-bromoethylene	175.84	-83.5	113.8	1.913^{15}_{4}	867
101	C_2HBr_3	Tribromoethylene $Br_2C:CHBr$	264.76		164	2.708	778
102	$C_2HBr_3Cl_2$	1, 2, 2-Tribromo-1, 2-dichloroethane	335.67	6	112^{16}	2.635^{15}_{4}	781
103	C_2HBr_3O	Bromal Br_3CCHO. .	280.76		174	2.30^{15}	
104	$C_2HBr_3O_2$	Tribromoacetic acid Br_3CCO_2H	296.76	130	245 d.		
105	C_2HBr_5	Pentabromoethane Br_3CCHBr_2	424.59	57	210^{400}	3.312	
106	C_2HCl_3	Trichloroethylene $Cl_2C:CHCl$	131.38	-86.4	88	1.477	525
107	C_2HCl_3O	Chloral Cl_3CCHO.. .	147.38	-57.5	98.1	1.512	455
108	C_2HCl_3O	Dichloroacetyl chloride $Cl_2CHCOCl$.	147.38		108		
109	$C_2HCl_3O_2$	Trichloroacetic acid Cl_3CCO_2H	163.38	57.5	195.3	1.617^{46}_{15}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
110	$C_2HCl_3O_2$	*Dichloromethyl chloroformate*	163 38		116	1.558^{14}	
111	C_2HCl_5	*Pentachloroethane* Cl_3CCHCl_2	202 298	−29.0	162	1.709^{0}_{4}	614
112	C_2HF_3	Trifluoroethylene	82 008		−51	1.26^{-78}	
112 1	$C_2HF_3O_2$	Trifluoroacetic acid F_3CCO_2H	114 01	−15.6	72.5	1.535^{0}	
113	C_2HI	Iodoacetylene IC.CH	151.94		32		
114	$C_2HI_3O_2$	Triiodoacetic acid I_3CCO_2H	437 80	150 d.			
115	C_2H_2	Acetylene HC.CH	26 015	−81.8	−83 6	Liq. $0\ 613^{-80}$ Sol. 0.730^{-85}	
116	$C_2H_2AsCl_3$	2-Chlorovinylarsine dichloride	207 35		190	1.888	
117	C_2H_2BrCl	*cis*-1-Bromo-2-chloroethylene	141 39		84 7	1.797^{15}_{4}	863
118	C_2H_2BrCl	*trans*-1-Bromo-2-chloroethylene	141 39	41	75 4	$1\ 777^{15}_{4}$	864
119	C_2H_2BrClO	Chloroacetyl bromide $ClCH_2COBr$	157.39		135	1.913^{0}	
120	$C_2H_2BrClO_2$	Bromochloroacetic acid $BrClCHCO_2H$	183 39	23 8	211 7 s. d.	1.985^{20}_{4}	
121	$C_2H_2BrCl_3$	1-Bromo-1, 2, 2-trichloroethane	212 31	−21	104 1	2.0554^{0}	
122	$C_2H_2Br_2$	1, 1-Acetylene dibromide $CH_2{:}CBr_2$	185 85		92	2 178	
123	$C_2H_2Br_2$	1, 2-Acetylene dibromide $BrCH{:}CHBr$	185 85		110.2	2 256	719
124	$C_2H_2Br_2O$	Bromoacetyl bromide $BrCH_2COBr$	201 85		150	$2.317^{21.5}_{21.5}$	
125	$C_2H_2Br_2O_2$	Dibromoacetic acid Br_2CHCO_2H	217.85	48	232		
126	$C_2H_2Br_3Cl$	1, 2, 2-Tribromo-1-chloroethane	301.22	20 6	220 d.	$2\ 652^{14}_{4}$	780
127	$C_2H_2Br_4$	1, 1, 1, 2-Tetrabromoethane $BrCH_2CBr_3$	345 68	0 0	$103\ 5^{13\ 5}$	2.875	794
128	$C_2H_2Br_4$	1, 1, 2, 2-Tetrabromoethane	345 68	0 1	151^{54}	2.964	796
129	$C_2H_2ClIO_2$	Chloroiodoacetic acid $ClICHCO_2H$	220.41	90			
130	C_2H_2ClNO	Chloromethyl isocyanate $ClCH_2CNO$	91.481		81		
132	$C_2H_2Cl_2$	*cis*-1, 2-Acetylene dichloride	96 931	−50.0	48.4	$1\ 265^{15}_{4}$	853
133	$C_2H_2Cl_2$	*trans*-1, 2-Acetylene dichloride	96 931	−80 5	60.3	1.291^{15}_{4}	854
134	$C_2H_2Cl_2O$	Dichloroacetaldehyde Cl_2CHCHO.	112 931		90.5		
135	$C_2H_2Cl_2O$	Chloroacetyl chloride $ClCH_2COCl$.	112 931		105	1.495^{0}	
136	$C_2H_2Cl_2O_2$	Dichloroacetic acid Cl_2CHCO_2H	128.931	10; −4	193.5	1 563	490
137	$C_2H_2Cl_2O_2$	Chloromethyl chloroformate	128.931		108	1 516	
138	$C_2H_2Cl_3NO$	Trichloroacetamide Cl_3CCONH_2	162.40	141	240		
139	$C_2H_2Cl_4$	1, 1, 1, 2-Tetrachloroethane	167.85		130.5	1.588	528
140	$C_2H_2Cl_4$	1, 1, 2, 2-Tetrachloroethane	167.85	−43 8	146.3	1.600	567
141	$C_2H_2F_2O_2$	Difluoroacetic acid F_2CHCO_2H.	96 015	−0.35	$134\ 2^{766}$	1.526	4
142	$C_2H_2F_3NO$	Trifluoroacetamide F_3CCONH_2	113.023	74.8	162 5		
143	$C_2H_2I_2O_2$	Diiodoacetic acid I_2CHCO_2H	311.88	110			
144	$C_2H_2N_4$	1, 2, 4, 5-Tetrazine	82 047	99			
145	C_2H_2O	Ketene $CH_2{:}CO$	42 015	−151	−56		
146	$C_2H_2O_2$	Glyoxal CHO.CHO	58 015	15	50 4	1 14	46
147	$C_2H_2O_4$	Oxalic acid HO_2CCO_2H.	90 015	189		2	1194
148	C_2H_3Br	Vinyl bromide $CH_2{:}CHBr$	106 939	−137 8	15.8	$1\ 517^{14}_{4}$	415
149	C_2H_3BrO	Acetyl bromide CH_3COBr	122 939	−96 5	76.7	$1\ 52^{9\ 5}$	
150	$C_2H_3BrO_2$	Bromoacetic acid CH_2BrCO_2H	138 939	50	208	1.934	
151	$C_2H_3Br_3$	1, 1, 2-Tribromoethane $BrCH_2CHBr_2$	266 77	−26	188 4	2.579	773
152	$C_2H_3Br_3O$	Tribromoethyl alcohol Br_3CCH_2OH	282 77	80	94^{11}		
152 1	$C_2H_3Br_3O_2$	Bromal hydrate.	298 77	53			1333
153	C_2H_3Cl	Vinyl chloride $CH_2{:}CHCl$	62 481		−15		
154	C_2H_3ClO	Acetyl chloride CH_3COCl	78 481	−112 0	52	1 104	76
155	$C_2H_3ClO_2$	Methyl chloroformate $ClCO_2CH_3$	94 481		71 4	1.236^{15}	
156	$C_2H_3ClO_2$	Chloroacetic acid CH_2ClCO_2H	94.481	α61 2 β56 3 γ50 1 δ43 8 (?)	189 5	$1\ 370^{65}_{4}$	1099
157	$C_2H_3Cl_2NO$	Dichloroacetamide $Cl_2CHCONH_2$	127.947	98	234 6		
158	$C_2H_3Cl_3$	1, 1, 1-Trichloroethane CH_3CCl_3	133.397		74 1	1 334	350
159	$C_2H_3Cl_3$	1, 1, 2-Trichloroethane $ClCH_2CHCl_2$	133 397	−36 7	113 5	1.443	506
160	$C_2H_3Cl_3O$	Trichloroethyl alcohol Cl_3CCH_2OH	149 397	17 8	152 2	$1\ 550^{23\ 3}$	
161	$C_2H_3Cl_3O_2$	Chloral hydrate $Cl_3CCH(OH)_2$	183 41	47 4	98 d.	1 908	1258
162	C_2H_3FO	Acetyl fluoride CH_3COF	62 023	> −60	20.5	$0\ 993^{20}$	
163	$C_2H_3FO_2$	Fluoroacetic acid CH_2FCO_2H	78 023	33	165		
164	C_2H_3I	Vinyl iodide $CH_2{:}CHI$	153 96		56	$2\ 08^{0}$	
165	C_2H_3IO	Iodoacetaldehyde CH_2ICHO.	169 96		80 d.		
166	C_2H_3IO	Acetyl iodide CH_3COI	169.96		108	1.98^{17}	
167	$C_2H_3IO_2$	Iodoacetic acid ICH_2CO_2H	185.96	82			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
168	C_2H_3N	Acetonitrile CH_3CN.	41.031	−41	82	0.783	6
169	C_2H_3N	Methyl isocyanide CH_3NC.	41.031	−45	59.6	0.756^{4}	
170	C_2H_3NO	Glycollic nitrile $HOCH_2CN$	57.031		183	1.104	952
172	C_2H_3NO	Methyl isocyanate $CH_3N{:}CO$	57.031		43		
173	$C_2H_3NO_2$	Nitroethylene $CH_2{:}CHNO_2$	73.031		98.5	$1.073^{13.6}$	
174	$C_2H_3NO_3$	Oxamic acid HO_2CCONH_2	89.031	210 d.			
175	$C_2H_3NO_4$	Nitroacetic acid $O_2NCH_2CO_2H$	105.03	89			
176	C_2H_3NS	Methyl thiocyanate CH_3CNS	73.096	−51	133	1.068	501
177	C_2H_3NS	Methyl isothiocyanate $CH_3N{:}CS$.	73.096	35	119	1.069^{27}_{4}	1052
178	$C_2H_3N_3$	1, 2, 4-Triazole......... ...	69.047	121	260		
179	$C_2H_3N_3O_6$	1, 1, 1-Trinitroethane $(O_2N)_3CCH_3$	165.05	56			
180	C_2H_4	Ethylene $H_2C{:}CH_2$. .	28.0308	−169.4	103.8	0.566^{102}_{4}	
181	C_2H_4BrCl	1-Bromo-2-chloroethane $ClCH_2CH_2Br$	143.405	−16.6	103.7	1.79^{0}	
182	C_2H_4BrNO	Acetobromoamide $CH_3CONHBr$	137.96	108			
183	$C_2H_4Br_2$	1, 1-Dibromoethane CH_3CHBr_2	187.86		110	2.056	647
184	$C_2H_4Br_2$	Ethylene bromide $BrCH_2CH_2Br$	187.86	10.0	131.7	2.182	710
185	$C_2H_4Br_2O$	Dibromoethyl alcohol Br_2CHCH_2OH	203.86		181	2.35^{0}	
186	$C_2H_4Br_2O$	*sym.*-Dibromomethyl ether $(BrCH_2)_2O$	203.86	−34	155	2.201	
187	C_2H_4ClNO	Acetochloroamide $CH_3CONHCl$	93.497	110			
188	C_2H_4ClNO	Chloroacetamide $ClCH_2CONH_2$	93.497	119.5	225.6		
189	$C_2H_4Cl_2$	1, 1-Dichloroethane CH_3CHCl_2	98.947	−96.7	57.3	1.174	227
190	$C_2H_4Cl_2$	Ethylene chloride $ClCH_2CH_2Cl$	98.947	−35.3	83.7	1.257	400
191	$C_2H_4Cl_2O$	Dichloroethyl alcohol Cl_2CHCH_2OH	114.947		146	1.145^{15}	
192	$C_2H_4Cl_2O$	*sym.*-Dichloromethyl ether $(ClCH_2)_2O$	114.947		106	1.315	349
193	$C_2H_4Cl_2OS$	Di-(chloromethyl) sulfoxide ...	147.01	40			
194	$C_2H_4Cl_2S$	*sym.*-Dichloromethyl sulfide. ..	131.012		58.5^{18}	1.114^{14}_{4}	
195	$C_2H_4Cl_3NO$	Chloral ammonia $Cl_3CCHO.NH_3$.	164.41	74	100 d.		
196	$C_2H_4I_2$	1, 1-Diiodoethane CH_3CHI_2	281.9		179	2.84^{0}	
197	$C_2H_4I_2$	Ethylene iodide ICH_2CH_2I.. .	281.9	82	d.	2.132^{10}	
199	$C_2H_4N_2O_2$	Oxamide $H_2NOCCONH_2$...	88.047	419 d.		1.667	
200	$C_2H_4N_2O_2$	Glyoxime $NOH{:}CHCH{:}NOH$	88.047	178			
201	$C_2H_4N_2O_3$	Ethylnitrolic acid $CH_3C(NO_2){:}NOH$	104.047	88	d.		
202	$C_2H_4N_2O_4$	1, 1-Dinitroethane $CH_3CH(NO_2)_2$	120.047		186	1.350^{23}_{23}	
203	$C_2H_4N_2O_4$	Ethylene dinitrite $ONOCH_2CH_2ONO$..	120.047	37.5	98	1.216^{0}	
204	$C_2H_4N_2O_5$	Ethylene nitrite nitrate..	136.047	d.		1.472	
205	$C_2H_4N_2O_6$	Dinitroglycol $(CH_2ONO_2)_2$	152.047	−20	exp. 116	1.496^{15}	
207	$C_2H_4N_4$	Dicyandiamide $H_2NC({:}NH)NHCN$	84.063	207			
208	C_2H_4O	Acetaldehyde CH_3CHO ..	44.031	−123.5	20.2	0.781	3
209	C_2H_4O	Ethylene oxide... .	44.031	−111.3	10.7	0.887^{7}_{4}	803
210	C_2H_4OS	Thioacetic acid CH_3COSH	76.096	< −17	93	1.074^{10}	
211	$C_2H_4O_2$	Glycollic aldehyde $HOCH_2CHO$	60.031	97			
212	$C_2H_4O_2$	Acetic acid CH_3CO_2H....	60.031	16.6	118.1	1.049	26
213	$C_2H_4O_2$	Methyl formate HCO_2CH_3 .	60.031	−99.8	31.8	0.975	5
214	$C_2H_4O_3$	Glycollic acid $HOCH_2CO_2H$	76.031	α63.0 β79			
215	$C_2H_4O_3$	Methyl acid carbonate CH_3HCO_3	76.031	−57			
216	$C_2H_4O_3$	Ethylene ozonide.	76.031		18^{16}		
217	$C_2H_4O_5S$	Sulfoacetic acid $HO_3SCH_2CO_2H$	140.10	86			
218	C_2H_4S	Ethylene sulfide.........	60.096		55	1.034	
219	$C_2H_5AsO_5$	Arsonoacetic acid $(OH)_2AsOCH_2COOH$	184.00	152			
220	C_2H_5Br	Ethyl bromide........	108.955	−119.0	38.0	1.430	275
221	C_2H_5BrO	2-Bromoethyl alcohol $BrCH_2CH_2OH$	124.955		150.3	1.685	555
222	C_2H_5BrO	Bromomethyl methyl ether .	124.955		87	$1.531^{12.3}$	458
224	C_2H_5Cl	Ethyl chloride ...	64.497	−138.7	12.2	0.910	
225	$C_2H_5ClO_4S$	Chloromethyl methyl sulfate	160.56		92^{18}	1.473	
226	$C_2H_5Cl_2N$	Ethyl dichloramine $C_2H_5NCl_2$	113.963		89		
227	C_2H_5ClO	2-Chloroethyl alcohol $ClCH_2CH_2OH$	80.497	−69.0	128.8	1.213	
228	C_2H_5ClO	Chloromethyl methyl ether.	80.497		59.5	1.063^{10}	107
229	C_2H_5ClO	Ethyl hypochlorite . .	80.497		36.6		
230	$C_2H_5ClO_2S$	Ethylsulfone chloride $CH_3CH_2SO_2Cl$	128.562		177.5	1.357	
231	$C_2H_5ClO_4$	Ethyl perchlorate	128.497		74		
232	C_2H_5F	Ethyl fluoride .	48.039		−32	1.7	
233	C_2H_5FO	2-Fluoroethyl alcohol FCH_2CH_2OH	64.039	−26.5	103.4	1.114	21

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
234	C_2H_5I	Ethyl iodide	155 97	−108 5	72 2	1.933	644
235	C_2H_5IO	2-Iodoethyl alcohol ICH_2CH_2OH	171 97		177 s. d.	2.905	
236	C_2H_5IO	Iodomethyl methyl ether ICH_2OCH_3.	171 97		125	2.025^{16}	728
237	C_2H_5N	Vinylamine $H_2C{:}CHNH_2$	43 047		56	0.832	
238	C_2H_5NO	Acetamide CH_3CONH_2	59 047	81 0 69.4	222	1.159	1107, 1173, 1198
239	C_2H_5NO	Acetaldoxime $CH_3CH{:}NOH$	59.047	**47**	115	0 966	1070
240	$C_2H_5NO_2$	Acetohydroxamic acid $CH_3CONHOH$	75 047	88			
241	$C_2H_5NO_2$	Aminoacetic acid $H_2NCH_2CO_2H$	75 047	233 d.		1 161	1274
242	$C_2H_5NO_2$	Nitroethane $CH_3CH_2NO_2$.	75 047	< −50	114 8	1.056^{15}_{15}	84
243	$C_2H_5NO_2$	Ethyl nitrite CH_3CH_2ONO	75 047		17	$0.900^{15\ 5}$	
244	$C_2H_5NO_2$	Methyl carbamate CH_3CONH_2	75 047	52	177		
245	$C_2H_5NO_2$	Glycollicamide $HOCH_2CONH_2$	75 047	120			
246	$C_2H_5NO_3$	Nitroethyl alcohol $O_2NCH_2CH_2OH$	91 047	< −80	193 8	1.270^{15}	
247	$C_2H_5NO_3$	Ethyl nitrate $CH_3CH_2ONO_2$	91 047	−102 0	88 7	1.105	54
248	$C_2H_5NO_4\ (H_2O)$	Ammonium hydrogen oxalate	107 047			1 556	
249	$C_2H_5NO_4$	Nitroglycol $HOCH_2CH_2NO_3$	107 047	d.		$1\ 31^{11}$	
250	C_2H_5NS	Thioacetamide CH_3CSNH_2	75 112	108.5			
251	$C_2H_5N_3O_2$	Biuret $NH(CONH_2)_2$	103 063	193			
252	C_2H_6	Ethane $CH_3\,CH_3$.	30 0462	−172 0	−88.3	$0\ 546^{-88}$	
253	C_2H_6AsBr	Cacodyl bromide $(CH_3)_2AsBr$	184 92		130		
254	C_2H_6AsCl	Cacodyl chloride $(CH_3)_2AsCl$	140 464		106 5	> 1	
255	$C_2H_6AsCl_3$	Cacodyl trichloride $(CH_3)_2AsCl_3$	211 38	50 d.			
256	C_2H_6AsI	Cacodyl iodide $(CH_3)_2AsI$	231 94		160		
257	C_2H_6NO	Aminoacetamide $H_2NCH_2CONH_2$	74 06	65			
258	$C_2H_6N_2O$	Dimethylnitrosamine $(CH_3)_2N\ NO$	74 062		152 5	1 003	356
259	$C_2H_6N_2O$	*N*-Methylurea $CH_3NHCONH_2$	74 062	101		1 204	
260	$C_2H_6N_4O_2$	Oxalyl dihydrazide $(CONHNH_2)_2$	118 08	235 d.			
261	$C_2H_6N_4S$	Guanidine thiocyanate	118 143	118			
262	C_2H_6O	Ethyl alcohol C_2H_5OH	46 046	−117 3	78 5	0 789	17
263	C_2H_6O	Methyl ether CH_3OCH_3	46 046	−138 0	−24 9	1 617	
264	$C_2H_6O_2$	Glycol $HOCH_2CH_2OH$	62 046	−17 4	197 5	1 115	305
265	$C_2H_6O_2S$	Dimethyl sulfone $(CH_3)_2SO_2$	94 111	193	238		
266	$C_2H_6O_3S$	Methyl sulfite $(CH_3)_2SO_3$	110 111		126 5	1.046	
267	$C_2H_6O_4$	Acetyl peroxide $(CH_3CO)_2O_2$	94 046	30	63^{21}		
268	$C_2H_6O_4S$	Ethylsulfuric acid $C_2H_5SO_4H$	126 111		d.	$1\ 316^{17}$	
269	$C_2H_6O_4S$	Methyl sulfate $(CH_3)_2SO_4$	126 111	−31 8	188 8	$1\ 333^{15}_{15}$	66
270	$C_2H_6O_6$	Oxalic acid dihydrate	126 046	101 5		1 64	1206
271	$C_2H_6O_6S_2$	Ethane-1, 2-disulfonic acid	190 18	104			
272	C_2H_6S	Methyl sulfide $(CH_3)_2S$	62 111	−83 2	36 2	0 849	
273	C_2H_6S	Ethylmercaptan C_2H_5SH	62 111	−121 0	34 7	0 840	323
274	$C_2H_6S_2$	Methyl disulfide CH_3SSCH_3	94 176		118	1 046	
275	$C_2H_6S_2$	Ethylenemercaptan $HSCH_2CH_2SH$	94 176		146	1 123	
276	C_2H_6Se	Ethylhydroselenide C_2H_5SeH	109 246		53 5	1 395	
277	C_2H_6Te	Methyl telluride $(CH_3)_2Te$	157 546		82		
278	C_2H_7As	Dimethylarsine $(CH_3)_2AsH$	106 014		36	$1\ 213^{20}$	
279	C_2H_7As	Ethylarsine $C_2H_5AsH_2$	106 014		36	1.217	
280	$C_2H_7AsO_2$	Cacodylic acid $(CH_3)_2AsO.OH$	138 014	200			
281	$C_2H_7AsO_3$	Ethylarsonic acid $C_2H_5AsO(OH)_2$	154 014	95			
282	C_2H_7N	Dimethylamine $(CH_3)_2NH$.	45 062	−96 0	7 4	$0\ 680^{0}_{4}$	
283	C_2H_7N	Ethylamine $C_2H_5NH_2$	45 062	−80 6	16 6	$0\ 689^{15}_{15}$	
284	C_2H_7NO	Acetaldehyde ammonia $CH_3CHO\ NH_3$	61 062	97	110 s. d.		1333
285	C_2H_7NO	2-Aminoethyl alcohol $H_2NCH_2CH_2OH$	61 062		171	$1\ 022^{20}$	446
286	C_2H_7NO	Dimethylhydroxylamine $(CH_3)_2NOH$.	61 062		42 4		
287	C_2H_7NO	α-Ethylhydroxylamine $NH_2OC_2H_5$	61 062		68	$0\ 883^{7\ 5}$	
288	C_2H_7NO	β-Ethylhydroxylamine C_2H_5NHOH	61 062	59 d.		0 908	1098
289	$C_2H_7NO_2$	Ammonium acetate $CH_3CO_2NH_4$	77 062	114		1 073	
290	$C_2H_7NO_3S$	Taurine $H_2NCH_2CH_2SO_3H$	125 127	88			
290 1	$C_2H_7N_3$	Diazoaminoethane $C_2H_5N.N.NH_2$	73 08	−12	92 s. d.		
291	$C_2H_7N_3O_4$	Methylurea nitrate	137 08	128			
292	$C_2H_7O_2P$	Dimethylphosphinic acid $(CH_3)_2PO.OH$	94 08	76			
293	$C_2H_7O_3P$	Ethylphosphinic acid $C_2H_5PO(OH)_2$. . .	110.08	44			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
294	C_2H_7P	Dimethylphosphine $(CH_3)_2PH$	62.078		25		
295	C_2H_7P	Ethylphosphine $C_2H_5PH_2$	62.078		25	<1	
296	C_2H_8BrN	Ethylamine hydrobromide	125.986	159.5		1.741	
297	C_2H_8ClN	Dimethylamine hydrochloride	81.528	171			
298	C_2H_8ClN	Ethylamine hydrochloride . .	81.528	109		1.216	
299	C_2H_8IN	Ethylamine hydroiodide $C_2H_5NH_2.HI$	173.00	188.5		2.100	
300	$C_2H_8N_2$	Ethylenediamine $H_2NCH_2CH_2NH_2$	60.078	8.5	117	$0.892^{26.1}_{4}$	1032
301	$C_2H_8N_2$	*unsym.*-Dimethylhydrazine	60.078		64	0.794	987
302	$C_2H_8N_2$	Ethylhydrazine $C_2H_5NHNH_2$	60.078		101.5		
303	$C_2H_8N_2O_4(H_2O)$	Ammonium oxalate. . .	124.078			1.501	1233
304	$C_2H_8N_4$	Ethyltetrazine . .	88.094	< 20	140 d.		
305	$C_2H_8N_4O_3$	Methylguanidine nitrate	136.09	150			
306	$C_2H_{10}Cl_2N_2$	Ethylenediamine hydrochloride	133.01				1284
307	$C_2H_{10}N_2O$	Ethylenediamine hydrate	78.093	10	118	0.963	433
308	$C_2H_{14}N_8O_4S$	Aminoguanidine sulfate	246.24	161			
308.1	$C_3Cl_3N_3$	Cyanuric trichloride	184.40	146		1.32	
309	C_3Cl_8	Octachloropropane $Cl_3CCCl_2CCl_3$	319.66	160	269		
310	C_3O_2	Carbon suboxide $OC:C:CO$	68.00	−107	6.3	1.114^{0}	802
311	$C_3HCl_3O_2$	Trichloroacrylic acid $Cl_2C:CClCO_2H$	175.38	72.9	223		
312	C_3HCl_7	Heptachloropropane $Cl_2CHCCl_2CCl_3$	285.21	30	248	1.805^{24}_{4}	
313	C_3HN	Cyanoacetylene $HC:CCN$	51.016	5	42.5	0.816	911
313.1	$C_3H_2Br_2N_2O$	Dibromocyanoacetamide.	245.86	123		2.375	
314	$C_3H_2Cl_2O_2$	Malonyl chloride $H_2C(COCl)_2$	140.93		58^{28}	1.450	1009
315	$C_3H_2Cl_3NO$	2, 2, 2-Trichlorolactic nitrile	174.40	61	220		
316	$C_3H_2N_2$	Malonic nitrile $H_2C(CN)_2$	66.031	32.1	220	$1.049^{34.2}_{4}$	1042
317	$C_3H_2N_2O_3$	Parabanic acid $CO<(NHCO)_2>$	114.031	227 d.			1333
318	C_3H_2O	Propargyl aldehyde $HC:CCHO$.	54.015		61		
319	$C_3H_2O_2$	Propiolic acid $HC:C.CO_2H$	70.015	9	144 d.	1.139^{15}_{14}	
320	$C_3H_3BrO_2$	1-Bromoacrylic acid $CH_2:CBrCO_2H$	150.94	70			
321	$C_3H_3BrO_2$	2-Bromoacrylic acid $BrCH:CHCO_2H$	150.94	116			
322	$C_3H_3BrO_4$	Bromomalonic acid $BrCH(CO_2H)_2$	182.94	112 d.			
323	C_3H_3Cl	3-Chloroallylene $ClCH_2C:CH$ . .	74.481		65	1.045^{5}	
323.1	C_3H_3ClO	Acryl chloride $H_2C:CHCOCl$	90.481		76	1.14^{0}	
324	$C_3H_3ClO_2$	1-Chloroacrylic acid $CH_2:CClCO_2H$	106.48	65			
325	$C_3H_3ClO_2$	2-Chloroacrylic acid $ClCH:CHCO_2H$	106.48	85			
326	$C_3H_3ClO_4$	Chloromalonic acid $ClCH(CO_2H)_2$	138.48	133			
327	$C_3H_3Cl_3O$	1, 1, 1-Trichloroacetone CH_3COCCl_3	161.40		149		
328	$C_3H_3Cl_3O$	1, 1, 1′-Trichloroacetone .	161.40		172		
329	$C_3H_3Cl_3O_2$	Methyl trichloroacetate $Cl_3CCO_2CH_3$	177.40	−17.5	153.8	$1.489^{19.2}_{19.2}$	
330	$C_3H_3Cl_3O_3$	2, 2, 2-Trichlorolactic acid	193.40	124	170^{46}		
331	$C_3H_3Cl_5$	Pentachloropropane . . .	216.31		198	1.607^{24}_{4}	645
332	C_3H_3N	Acrylic nitrile $CH_2:CHCN$	53.031	−82.0	79		
332.1	C_3H_3NO	Pyruvic nitrile CH_3COCN	69.04		93		
333	$C_3H_3NO_2$	Cyanoacetic acid $NCCH_2CO_2H$	85.031	66	$108^{0.15}$		
334	C_3H_3NS	Thiazole.	85.096		116.8	1.198	
335	$C_3H_3N_3O_3$	Cyanuric acid	129.047	>360			1333
336	$C_3H_3N_3O_3$	Fulminuric acid $(CNOH)_3$	129.05	145 d.			
337	C_3H_4	Allene $H_2C:C:CH_2$.	40.031	−146	−32		
338	C_3H_4	Allylene $HC:CCH_3$.	40.031	−104.7	−27.5	$0.660^{-12.9}_{4}$	
339	$C_3H_4Br_2$	*cis*-1, 2-Dibromopropylene	199.86		135.2	2.024	924
340	$C_3H_4Br_2$	*trans*-1, 2-Dibromopropylene	199.86		126	2.024	925
341	$C_3H_4Br_2$	2, 3-Dibromopropylene	199.86		142.3	1.934	
342	$C_3H_4Br_2O_2$	1, 1-Dibromopropionic acid	231.86	61	221		
343	$C_3H_4Br_2O_2$	1, 2-Dibromopropionic acid	231.86	64; 51	160^{20}		
344	$C_3H_4Br_4$	1, 1, 2, 2-Tetrabromopropane	359.69		230 s. d.	2.94^{0}	
345	$C_3H_4Br_4$	1, 2, 2, 3-Tetrabromopropane	359.69	11	230 d.	2.653^{18}_{0}	
346	$C_3H_4Cl_2O$	*sym.*-Dichloroacetone $(ClCH_2)_2CO$	126.947	45	173.4	1.383^{46}_{4}	
347	$C_3H_4Cl_2O$	*unsym.*-Dichloroacetone .	126.947		120	1.234^{16}	
348	$C_3H_4Cl_2O_2$	2, 2-Dichloropropionic acid	142.947	56	190		
349	$C_3H_4Cl_3NO_2$	Chloral formamide $Cl_3CCHO.HCONH_2$	192.41	116			
350	$C_3H_4N_2$	Imidazole	68.047	90	256		
351	$C_3H_4N_2$	Pyrazole	68.047	70	188		
352	$C_3H_4N_2O$	Cyanoacetamide $NCCH_2CONH_2$.	84.047	120			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
353	$C_3H_4N_2O$	Pyrazolone —NHCOCH$_2$CH:N—.	84.047	165			
354	$C_3H_4N_2O_2$	Hydantoin —NHCONHCH$_2$CO—	100.047	220			
355	C_3H_4O	Propargyl alcohol HC:CCH$_2$OH.	56.031	−17	115	0.972	324
356	C_3H_4O	Acrolein H$_2$C.CH.CHO	56.031	−87.7	52.5	0.841	119
357	C_3H_4O	Allylene oxide.	56.031		63		
358	$C_3H_4O_2$	Acrylic acid H$_2$CCHCO$_2$H . . .	72.031	12.3	141.9	1.051	264
359	$C_3H_4O_3$	Pyruvic acid CH$_3$COCO$_2$H . . .	88.031	13.6	165	1.267	873
360	$C_3H_4O_4$	Malonic acid CH$_2$(CO$_2$H)$_2$	104.031	135.6			
361	$C_3H_4O_4$	Methyl hydrogen oxalate	104.031	54	163.3	1.422^{64}	1191
362	$C_3H_4O_5$	Tartronic acid HOCH(CO$_2$H)$_2$.	120.031	158 d.			1333
363	$C_3H_4O_6$	Mesoxalic acid (HO)$_2$C(CO$_2$H)$_2$.	136.03	121			
364	C_3H_5Br	*1-Bromopropylene* CH$_3$CH.CHBr	120.955	−116.6	60.2	$1.428^{19.5}$	452
365	C_3H_5Br	*2-Bromopropylene* CH$_3$CBr:CH$_2$	120.955	−124.8	48.4	1.362^{20}	
366	C_3H_5Br	*3-Bromopropylene* BrCH$_2$CH:CH$_2$	120.955	−119.4	71.3	1.398	489
367	C_3H_5BrO	Bromoacetone CH$_3$COCH$_2$Br	136.955	−54	127	1.603	
368	$C_3H_5BrO_2$	*dl*-1-Bromopropionic acid	152.955	25.7	203.5	1.700	522
369	$C_3H_5BrO_2$	2-Bromopropionic acid	152.96	61			
370	$C_3H_5Br_3$	1, 1, 2-Tribromopropane	280.79		201	2.356	
371	$C_3H_5Br_3$	1, 2, 2-Tribromopropane .	280.79		191	2.33^{12}	
372	$C_3H_5Br_3$	1, 2, 3-Tribromopropane	280.79	17	222	2.436^{23}	767
373	C_3H_5Cl	1-Chloropropylene CH$_3$CH:CHCl	76.497		36		
374	C_3H_5Cl	2-Chloropropylene CH$_3$CCl:CH$_2$	76.497	−137.4	22.7	0.931^0	
375	C_3H_5Cl	3-Chloropropylene ClCH$_2$CH:CH$_2$	76.497	−136.4	44.6	0.938	222
376	$C_3H_5ClN_2O_6$	Chlorodinitrohydrin	200.51	6.8	123^{15}	1.54^{15}	
377	C_3H_5ClO	Chloroacetone CH$_3$COCH$_2$Cl	92.497	−44.5	121	1.162^{16}	
378	C_3H_5ClO	Propionyl chloride C$_2$H$_5$COCl	92.497	−94.0	80	1.065	152
379	C_3H_5ClO	α-Epichlorohydrin .	92.497	−25.6	117	1.184	895
380	$C_3H_5ClO_2$	Chloroacetyl carbinol	108.497	74 d.			
381	$C_3H_5ClO_2$	1-Chloropropionic acid.	108.497		186	1.306^9	
382	$C_3H_5ClO_2$	2-Chloropropionic acid	108.497	61	204		
383	$C_3H_5ClO_2$	Ethyl chloroformate ClCO$_2$C$_2$H$_5$ . .	108.497	−80.6	95	$1.139^{18.2}_{15}$	
384	$C_3H_5ClO_2$	Methyl chloroacetate ClCH$_2$CO$_2$CH$_3$	108.497	−32.7	131.5	1.22	
385	$C_3H_5Cl_3$	1, 1, 2-Trichloropropane . .	147.413		137	1.372^{25}	
386	$C_3H_5Cl_3$	1, 1, 3-Trichloropropane.	147.413		148	1.362^{15}	
387	$C_3H_5Cl_3$	1, 2, 2-Trichloropropane.	147.413		123	1.318^{25}	
388	$C_3H_5Cl_3$	1, 2, 3-Trichloropropane	147.413	−14.7	156	1.417^{15}	
389	$C_3H_5Cl_3O$	1, 1, 1-Trichloroisopropyl alcohol	163.413	50	161.3		
390	C_3H_5I	2-Iodopropylene CH$_3$CI:CH$_2$ . .	167.97		103	1.835	
391	C_3H_5I	3-Iodopropylene ICH$_2$CH:CH$_2$	167.97	−99.3	103.1	1.848^{12}_{12}	
392	C_3H_5IO	Iodoacetone CH$_3$COCH$_2$I	183.97		58.4^{11}	2.17^{15}	
393	$C_3H_5IO_2$	1-Iodopropionic acid CH$_3$CHICO$_2$H.	199.97	45.5	$105^{0.3}$		
394	$C_3H_5IO_2$	2-Iodopropionic acid ICH$_2$CH$_2$CO$_2$H	199.97	82			
395	C_3H_5N	Propionitrile C$_2$H$_5$CN.	55.047	−91.9	97.1	0.783	22
396	C_3H_5N	Ethyl isocyanide C$_2$H$_5$NC.	55.047	< −66	79	$0.742^{21.3}$	19
397	C_3H_5NO	Ethyl isocyanate C$_2$H$_5$CNO. . . .	71.047		60	0.898	
398	C_3H_5NO	Acrylamide CH$_2$:CHCONH$_2$	71.047	85			
399	C_3H_5NO	2-Hydroxypropionitrile HOCH$_2$CH$_2$CN	71.047		221	1.059	
400	C_3H_5NO	Lactonitrile CH$_3$CH(OH)CN .	71.047	−40.0	184 s. d.	0.992	944
401	$C_3H_5NO_2$	Isonitrosoacetone CH$_3$COCH(:NOH).	87.407	69			
402	$C_3H_5NO_2$	Allyl nitrite C$_3$H$_5$ONO.	87.047		44	0.955^0	
403	C_3H_5NS	Ethyl thiocyanate C$_2$H$_5$CNS	87.112	−85.5	144.4	0.996	494
404	C_3H_5NS	Ethyl isothiocyanate C$_2$H$_5$CSN	87.112	−5.9	132	0.995	651
405	$C_3H_5NS_2$	μ-Mercaptothiazoline	119.177		217		
406	$C_3H_5N_3O_6$	Glycerol trinitrite .	179.06		154	1.291^{10}_{15}	
407	$C_3H_5N_3O_9$	Glycerol trinitrate	227.06	2.9 13.2	160^{15} exp. 260	1.601^{15}	
408	C_3H_6	Cyclopropane	42.046	−126.6	−34.4	0.720^{-79}	
409	C_3H_6	Propylene CH$_3$CH:CH$_2$	42.046	−185.2	−47.0	0.609^{-47}_{4}	
410	C_3H_6AsN	Cacodyl cyanide (CH$_3$)$_2$AsCN.	131.014		138		
411	$C_3H_6Br_2$	1, 1-Dibromopropane CH$_3$CH$_2$CHBr$_2$	201.88		130		
412	$C_3H_6Br_2$	1, 2-Dibromopropane CH$_3$CHBrCH$_2$Br	201.88	−55.5	140	1.933	664
413	$C_3H_6Br_2$	1, 3-Dibromopropane	201.88	−34.4	167.0	1.979	671
414	$C_3H_6Br_2$	2, 2-Dibromopropane CH$_3$CBr$_2$CH$_3$.	201.88		114.5	1.783	
415	$C_3H_6Br_2O$	1, 1′-Dibromoisopropyl alcohol	217.88		219	2.11^{18}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
416	$C_3H_6Br_2O$	2, 3-Dibromopropyl alcohol	217.88		219	2.168^{0}	
417	$C_3H_6Cl_2$	1, 1-Dichloropropane $CH_3CH_2CHCl_2$	112.962		87	1.143^{10}	
418	$C_3H_6Cl_2$	1, 2-Dichloropropane $CH_3CHClCH_2Cl$	112.962		96.8	1.166^{14}	
419	$C_3H_6Cl_2$	1, 3-Dichloropropane $ClCH_2CH_2CH_2Cl$	112.962		125	1.201^{15}	
420	$C_3H_6Cl_2$	2, 2-Dichloropropane $CH_3CCl_2CH_3$	112.962		69.7	1.093	177
421	$C_3H_6Cl_2O$	1, 1-Dichloroisopropyl alcohol	128.96		147.8	1.333	
422	$C_3H_6Cl_2O$	1, 1'-Dichloroisopropyl alcohol	128.96		174	1.367	532
423	$C_3H_6Cl_2O$	2, 3-Dichloropropyl alcohol	128.96		183	1.355	
424	$C_3H_6Cl_2O_2$	Dichloromethylal $H_2C(OCH_2Cl)_2$	144.96		166	1.352^{11}_{11}	
425	$C_3H_6Cl_9N_3$	*cis*-Chloralimide.......	403.19	155			
426	C_3H_6INO	Iodoacetoxime $ICH_2C(:NOH)CH_3$	198.99	64.5			
427	$C_3H_6I_2$	1, 2-Diiodopropane CH_3CHICH_2I	295.91		d.	2.490	
428	$C_3H_6I_2$	1, 3-Diiodopropane $ICH_2CH_2CH_2I$	295.91	−13.0	224	2.576^{15}	797
429	$C_3H_6I_2$	2, 2-Diiodopropane $(CH_3)_2CI_2$	295.91		148 d	2.446^{0}	
431	$C_3H_6N_2$	Pyrazoline........ .. .	70.062		144		
432	$C_3H_6N_2O$	Ethyleneurea $—CH_2NHCONHCH_2$	86.062	131			
433	$C_3H_6N_2O$	Ethylideneurea $CH_3CH:NCONH_2$	86.062	154	160 d		
434	$C_3H_6N_2OS$	Acetylthiourea $CH_3CONHCSNH_2$	118.13	165			
435	$C_3H_6N_2O_2$	Acetylurea $NH(COCH_3)_2$	102.062	217			
436	$C_3H_6N_2O_2$	Malonamide $H_2C(CONH_2)_2$	102.062	170			
437	$C_3H_6N_2O_2$	Methylglyoxime.	102.06	153			
438	$C_3H_6N_2O_3$	Hydantoic acid...	118.062	171			
439	$C_3H_6N_2O_3$	Propylnitrolic acid	118.06	66			
440	$C_3H_6N_2O_3$	Methyl allophanate	118.06	208			
441	$C_3H_6N_2O_3$	Propylpseudonitrole	118.06	76			
442	$C_3H_6N_2O_4$	Nitrourethane $C_2H_5CO_2NHNO_2$	134.06	64			
443	$C_3H_6N_2O_7$	Glycerol-1, 3-dinitrate . .	182.06	< −30	148^{15}	1.47^{15}	
444	$C_3H_6N_4O_3$	Ammonium fulminurate	146.078	d.			1166
445	$C_3H_6N_6$	Melamine $(CNNH_2)_3$	126.094	<250		1.573^{250}	1311
446	C_3H_6O	Allyl alcohol $CH_2:CHCH_2OH$	58.046	−129	97.0	0.855	204
447	C_3H_6O	Propionaldehyde C_2H_5CHO	58.046	−81	48.8	0.807	20
448	C_3H_6O	Acetone CH_3COCH_3..	58.046	−94.3	56.1	0.7915	14
449	$C_3H_6O_2$	Acetyl carbinol CH_3COCH_2OH	74.046	−17	146	1.082^{20}_{20}	315
450	$C_3H_6O_2$	Propionic acid $C_2H_5CO_2H$	74.046	−22	141.1	0.992	63
451	$C_3H_6O_2$	Ethyl formate $HCO_2C_2H_5$	74.046	−80.5	54.3	0.906	15
452	$C_3H_6O_2$	Methyl acetate $CH_3CO_2CH_3$	74.046	−98.1	57.1	0.933	18
453	$C_3H_6O_2$	Glycide $C_2H_3OCH_2OH$	74.046		162 d.	1.165	
454	$C_3H_6O_3$	Glyceric aldehyde $HOCH_2CHOHCHO$	90.046	138			
455	$C_3H_4O_3$	Dihydroxyacetone $HOCH_2COCH_2OH$	90.046	75			
456	$C_3H_6O_3$	*d*(*l*)-Lactic acid $CH_3CH(OH)CO_2H$.	90.046	27			
457	$C_3H_6O_3$	*dl*-Lactic acid $CH_3CH(OH)CO_2H$	90.046	18	122^{15}	1.249^{15}_{4}	381
458	$C_3H_6O_3$	Dimethyl carbonate $(CH_3O)_2CO$	90.046	0.5	89.7	1.069^{22}	
459	$C_3H_6O_3$	Ethyl acid carbonate $C_2H_5HCO_3$	90.046	−57			
460	$C_2H_6O_3$	Methyl glycollate $HOCH_2CO_2CH_3$	90.046		151.2	1.168^{18}	
461	$C_3H_6O_3$	α-Trihydroxymethylene	90.046	64	s. 46		
462	C_3H_6S	Allyl mercaptan $CH_2:CHCH_2SH$	74.111		90		
463	$C_3H_7AsO_3$	Allylarsonic acid....	166.01	128			
464	C_3H_7Br	*n*-Propyl bromide $CH_3CH_2CH_2Br$	122.97	−110.0	70.9	1.353	346
465	C_3H_7Br	Isopropyl bromide $(CH_3)_2CHBr$	122.97	−89.0	59.6	1.310	289
466	C_3H_7BrO	Bromoisopropyl alcohol	138.97		148		
467	C_3H_7BrO	3-Bromopropyl alcohol	138.97		112^{156}	1.537	
468	C_3H_7Cl	*n*-Propyl chloride $CH_3CH_2CH_2Cl$	78.512	−122.8	46.6	0.890	71
469	C_3H_7Cl	Isopropyl chloride $(CH_3)_2CHCl$	78.512	−117.0	36.5	0.860	
470	C_3H_7ClO	Chloroisopropyl alcohol.	94.512		126	1.115^{20}_{20}	371
471	C_3H_7ClO	2-Chloropropyl alcohol . .	94.512		134	1.103	354
472	$C_3H_7ClO_2$	2-Chloro-1, 3-dihydroxypropane	110.512		$124.5^{14.5}$	1.321	
473	$C_3H_7ClO_2$	3-Chloro-1, 2-dihydroxypropane	110.512		213 d.	1.322	
474	C_3H_7F	*n*-Propyl fluoride $CH_3CH_2CH_2F$	62.054		2		
475	C_3H_7I	*n*-Propyl iodide $CH_3CH_2CH_2I$	169.99	−101.4	102.4	1.747	621
476	C_3H_7I	Isopropyl iodide $(CH_3)_2CHI$	169.99	−90.8	89.5	1.703	597
477	C_3H_7IO	Iodoisopropyl alcohol.	185.99		105^{60}		
478	C_3H_7IO	3-Iodopropyl alcohol...	185.99		225.4	2.349^{13}	
479	C_3H_7N	Allylamine $CH_2:CHCH_2NH_2$	57.062		53.2	0.761	237

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
480	C_3H_7NO	Aminoacetone $CH_3COCH_2NH_2$	73.062		189 d.		
481	C_3H_7NO	Acetoxime $CH_3CH:NOH$	73.062	61	136.3	0.97^{20}_{20}	1162
482	C_3H_7NO	Propionamide $C_2H_5CONH_2$	73.062	79	213	1.042	1153
483	C_4H_7NOS	Thiourethane $C_2H_5COSNH_2$	105.13	108			
484	$C_3H_7NO_2$	*d*-Alanine $CH_3CH(NH_2)CO_2H$	89.062				1225
485	$C_3H_7NO_2$	*dl*-Alanine	89.062	295	s. >200		
486	$C_3H_7NO_2$	Sarcosine $CH_3NHCH_2CO_2H$	89.062	210 d.			
487	$C_3H_7NO_2$	*1-Nitropropane* $C_2H_5CH_2NO_2$	89.062		131.5	1.011^{16}	136
488	$C_3H_7NO_2$	*2-Nitropropane* $CH_3CH(NO_2)CH_3$	89.062		*120*	1.024^{0}	
489	$C_3H_7NO_2$	*Propyl nitrite* C_3H_7ONO	89.062		*57*	*0.935*	16
490	$C_3H_7NO_2$	*Isopropyl nitrite* $(CH_3)_2CHONO$	89.062		*45*	0.844^{25}	
491	$C_3H_7NO_2$	*Lactamide* $CH_3CH(OH)CONH_2$	89.062	74		1.138^{80}_{4}	
492	$C_3H_7NO_2$	*Urethane* $C_2H_5OCONH_2$	89.062	48	180	1.11^{20}_{20}	
493	$C_3H_7NO_3$	*dl*-Serine $HOCH_2CH(NH_2)CO_2H$.	105.062	246 d.			
493.1	$C_3H_7NO_3$	*d*-Serine $HOCH_2CH(NH_2)CO_2H$	105.062	228 d.			1249
494	$C_3H_7NO_3$	Isoserine $H_2NCH_2CH(OH)CO_2H$	105.062	242 d.			
495	$C_3H_7NO_3$	Propyl nitrate $C_3H_7ONO_2$	105.062		100.5	1.053^{25}	105
496	$C_3H_7NO_3$	Isopropyl nitrate $(CH_3)_2CHONO_2$.	105.062		102	1.036	
497	$C_3H_7NO_5$	Glycerol-1-nitrate	137.06	58	160	1.40	
498	$C_3H_7NO_5$	Glycerol-2-nitrate	137.06	54	160	1.40	
499	$C_3H_7N_3O$	Acetaldehyde semicarbazone	101.08	162			
500	C_3H_8	Propane $CH_3CH_2CH_3$	44.062	−189.9	−44.5	$0.585^{-44.5}_{4}$	
501	$C_3H_8ClNO_2S$	Cysteine hydrochloride	157.59	175			
502	$C_3H_8N_2O$	1, 2-Dimethylurea $CO(NHCH_3)_2$	88.078	102.5	270	1.142	
503	$C_3H_8N_2O$	1, 1-Dimethylurea $(CH_3)_2NCONH_2$	88.078	182		1.255	
504	$C_3H_8N_2O$	Ethylurea $C_2H_5NHCONH_2$	88.078	92		1.213^{18}	
505	C_3H_8O	*n*-Propyl alcohol $C_2H_5CH_2OH$	60.062	−127	97.8	0.804	59
506	C_3H_8O	Isopropyl alcohol $(CH_3)_2CHOH$.	60.062	−85.8	82.3	0.786	37
508	C_3H_8O	Methyl ethyl ether $CH_3OC_2H_5$	60.062		7.9	0.697	
509	$C_3H_8OS_2$	1, 2-Dithioglycerol	124.192	130 d.		$1.342^{11.4}$	
510	$C_3H_8O_2$	1, 2-Propyleneglycol	76.062		189	1.038^{23}	
511	$C_3H_8O_2$	Trimethyleneglycol $HO(CH_2)_3OH$	76.062		214 d.	1.053	
512	$C_3H_8O_2$	Glycol methyl ether $HOCH_2CH_2OCH_3$	76.062		124.6	0.969^{15}_{15}	
513	$C_3H_8O_2$	Methylal $HCH(OCH_3)_2$	76.062	−104.8	44	0.862	8
514	$C_3H_8O_2S$	1-Thioglycerol $HOCH_2CH_2(OH)CH_2SH$	108.127		d.	$1.295^{14.4}$	
515	$C_3H_8O_3$	Glycerol $HOCH(CH_2OH)_2$	92.062	17.9	290	1.260	512
516	$C_3H_8S_3$	Trithioglycerol $HSCH(CH_2SH)_2$	140.257	d.		$1.391^{11.4}$	
517	C_3H_8S	Methyl ethyl sulfide $CH_3SC_2H_5$	76.127	−104.8	66	0.837	
518	C_3H_8S	*n*-Propyl mercaptan C_3H_7SH	76.127	−111.5	68		
519	C_3H_8S	Isopropyl mercaptan $(CH_3)_2CHSH$. .	76.127		60		
520	C_3H_9As	Trimethylarsine $(CH_3)_3As$	120.029		52.8	1.124^{22}	
521	$C_3H_9AsO_3$	Propylarsonic acid $C_3H_7AsO_3H$	168.03	126			
522	C_3H_9Bi	Trimethyl bismuthine $(CH_3)_3Bi$	254.07		110	2.300^{18}	
523	$C_3H_9ClN_2O$	Lactamidine hydrochloride	124.54	171			
524	C_3H_9N	*n*-Propylamine $C_3H_7NH_2$	59.077	−83.0	48.7	0.719	72
525	C_3H_9N	Isopropylamine $(CH_3)_2CHNH_2$	59.077	−101.2	34	0.694	875
526	C_3H_9N	Trimethylamine $(CH_3)_3N$	59.077	−124.0	3.5	$0.662^{-5.2}$	
527	$C_3H_9N_3O_2$	Guanidine acetate	119.09	230			
528	$C_3H_9O_4P$	Trimethyl phosphate $(CH_3)_3PO_4$	140.09		193	1.220^{15}	
529	C_3H_9P	Propylphosphine $C_3H_7PH_2$	76.093		53.5		
530	C_3H_9P	Trimethylphosphine $(CH_3)_3P$	76.093		42	>1	
531	C_3H_9Sb	Trimethylstibine $(CH_3)_3Sb$	166.84		80.6	1.523^{15}	
532	$C_3H_{10}ClN$	Trimethylamine hydrochloride	95.543	275 d.			
533	$C_3H_{10}N_2$	*dl*-Propylenediamine $CH_2(CH_2NH_2)_2$	74.093		119	0.878	
534	$C_3H_{10}N_2$	Trimethylenediamine $H_2N(CH_2)_3NH_2$	74.093		135.5		
535	$C_3H_{12}N_6O_3$	Guanidine carbonate .	180.14	197		1.251^{4}	1169
537	C_4Br_4S	Thiophene tetrabromide	399.73	112			
538	$C_4Cl_{10}O$	Perchloroether $(C_2Cl_5)_2O$.	418.58	69		1.900^{14}	
539	$C_4F_6O_3$	Trifluoroacetic anhydride $(F_3CCO)_2O$	210.00	−65	40.5		
540	C_4I_2	Diiododiacetylene $IC:CC:CI$.	301.86	101			
541	C_4HBr_4N	Tetrabromopyrrole	382.68	250			
542	C_4HI_4N	Tetraiodopyrrole	570.74	150 d.			
543	C_4HN_3	Cyanoform $CH(CN)_3$.	91.032	93.5			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
544	$C_4H_2ClN_2O_3$	5, 5-Dichlorobarbituric acid .	196.95	211 d.			
545	$C_4H_2Cl_2O_2$	Fumaryl chloride $ClOCCH{:}CHCOCl$	152.93		160	1.410	938
546	$C_4H_2I_2S$	Thiophene diiodide . .	335.94	40			
547	$C_4H_2N_2O_4$	Alloxan $OC(NHCO)_2CO$	142.03	256 d.			
548	$C_4H_2O_3$	Maleic anhydride $({:}CHCO)_2O$	98.015	57	202	0.934	
549	$C_4H_2O_4$	Acetylenedicarboxylic acid	114.02	179			
550	$C_4H_3BrO_4$	Bromofumaric acid......... .	194.94	186			
551	$C_4H_3BrO_4$	Bromomaleic acid $HO_2CCBr{:}CHCO_2H$	194.94	141			
552	$C_4H_3ClN_2O_3$	5-Chlorobarbituric acid....	162.50	295 s. d.			
553	$C_4H_3NO_2S$	2-Nitrothiophene.......... .	129.096	46.5	225		
554	$C_4H_3N_3O_4$	Violuric acid.............	157.05	224 d.			
555	$C_4H_4AsCl_3$	*bis*-2-Chlorovinyl chloroarsine	233.36		230	1.702	
556	C_4H_4BrNS	2-Bromoallyl isothiocyanate	178.02		200		
557	$C_4H_4Br_2O_4$	1, 2-Dibromosuccinic acid	275.86	255			
558	$C_4H_4Cl_2O_2$	Succinyl chloride $(CH_2COCl)_2$	154.95	17	192	1.395	872
559	$C_4H_4Cl_2O_3$	Chloroacetic anhydride $(ClCH_2CO)_2O$	170.95	46	163^{116}		
560	$C_4H_4N_2$	Succinyl nitrile $(CH_2CN)_2$.	80.047	54.5	267	$0.985^{61.1}_{4}$	1097
561	$C_4H_4N_2$	Pyridazine (1, 2-Diazine) .	80.047	−8	208	1.107	1015
562	$C_4H_4N_2$	Pyrimidine (1, 3-Diazine)	80.047	22	124		
563	$C_4H_4N_2$	Pyrazine (1, 4-Diazine)..	80.047	53	118	1.031^{61}_{4}	1091
564	$C_4H_4N_2O_2$	Uracil $—NHCONHCH{:}CHCO$	112.05	338			
565	$C_4H_4N_2O_3$	Barbituric acid $OC(NHCO)_2CH_2$	128.047	245	260 d.		
567	$C_4H_4N_4$	Hydrocyanic acid (tetramer)	108.063	179 d			
568	C_4H_4O	Tetrolic aldehyde $CH_3C{:}CCHO$	68.031	−26	107	0.927^{17}	913
569	C_4H_4O	Furfural (Furan).... .	68.031		31	0.937	260
570	$C_4H_4O_2$	Tetrolic acid $CH_3C{:}CCO_2H$	84.031	76.5	203		
571	$C_4H_4O_3$	Succinic anhydride . .	100.031	119.6	261	1.104	
572	$C_4H_4O_3$	Tetronic acid $—OCH_2C(OH).CHCO$	100.03	141			
573	$C_4H_4O_4$	Fumaric acid $({:}CHCO_2H)_2$	116.031	287	290	1.635	
574	$C_4H_4O_4$	Maleic acid $({:}CHCO_2H)_2$	116.031	130.5	135 d.	1.590	
575	$C_4H_4O_5$	Hydroxymaleic acid . .	132.03	152			
576	C_4H_4S	Thiophene	84.096	−40.0	85	1.065	693
577	$C_4H_5BrO_4$	Bromosuccinic acid.. .	196.95	159			
578	C_4H_5ClO	Crotonyl chloride $CH_3CH{:}CHCOCl$	104.497		125	1.091	
579	$C_4H_5ClO_2$	1-Chloro-α-crotonic acid	120.50	99			
580	$C_4H_5ClO_2$	1-Chloro-β-crotonic acid	120.50	66			
581	$C_4H_5ClO_2$	2-Chloro-β-crotonic acid	120.50	61			
582	$C_4H_5Cl_3O$	1, 1, 2-Trichlorobutyraldehyde	175.41		165.4	1.396	523
583	$C_4H_5Cl_3O_2$	1, 1, 2-Trichlorobutyric acid	191.41	60	238		
584	$C_4H_5Cl_3O_2$	1, 1, 3-Trichlorobutyric acid	191.41	75			
585	$C_4H_5Cl_3O_2$	Ethyl trichloroacetate $Cl_3CCO_2C_2H_5$	191.41		168	1.383	437
586	$C_4H_5F_3O_2$	Ethyl trifluoroacetate $F_3CCO_2C_2H_5$	142.039		61.7	1.195^{18}	1
587	C_4H_5N	Allyl cyanide $CH_2{:}CHCH_2CN$	67.047		116.1	0.832	212
588	C_4H_5N	Allyl isocyanide $CH_2{:}CHCH_2NC$.	67.047		106	0.794^{17}	
589	C_4H_5N	Pyrrole.	67.047		131	0.948	612
590	$C_4H_5NO_2$	Ethyl cyanoformate $NCCO_2C_2H_5$	99.047		116	1.013	
591	$C_4H_5NO_2$	Methyl cyanoacetate $NCCH_2CO_2CH_3$	99.047		200	1.123^{15}_{4}	
592	$C_4H_5NO_2$	Succinimide............ .	99.047	124	288	1.412^{16}	1333
593	C_4H_5NS	Allyl thiocyanate $CH_2{:}CHCH_2CNS$	99.112		161	1.050	
594	C_4H_5NS	Allyl isothiocyanate $CH_2.CHCH_2CSN$.	99.112	−100.0	150.7	1.010^{20}	687
595	C_4H_6	1, 2-Butadiene $CH_2{:}C{:}CHCH_3$	54.046		19		
596	C_4H_6	1, 3-Butadiene $CH_2{:}CHCH.CH_2$	54.046		−2.6		
597	C_4H_6	Dimethylacetylene $(CH_3C\cdot)_2$	54.046		28.9		
598	C_4H_6	Ethylacetylene $C_2H_5C{:}CH$	54.046	−130	18.5	0.668^{0}	101
599	$C_4H_6As_2O_4$	Diarsenodiacetic acid . .	267.97	205 d.			
600	$C_4H_6Br_2O_2$	Ethyl dibromoacetate $Br_2CHCO_2C_2H_5$.	245.88		194	1.903	588
601	$C_4H_6Br_4$	1, 1, 4, 4-Tetrabromobutane	373.71		145^{10}	2.529	782
602	$C_4H_6Br_4$	1, 2, 3, 4-Tetrabromobutane	373.71	19; 39	181^{60}		
603	$C_4H_6Br_4$	2, 2, 3, 3-Tetrabromobutane	373.71	39	230		
604	$C_4H_6Cl_2O_2$	Ethyl dichloroacetate . . .	156.96		158.2	1.282	367
604.1	$C_4H_6Cl_2O_2$	Methyl 1, 2-dichloropropionate	156.96		92^{50}	1.328	
605	$C_4H_6Cl_4O$	1, 2, 2, 2-Tetrachloroethyl ether . .	211.88		189.7	1.422	
606	$C_4H_6N_2$	1-Methylimidazole........	82.062	−6	199	1.036^{10}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R I. No
607	$C_4H_6N_2$	4-Methylimidazole	82 062	56	262.9	1.008	
608	$C_4H_6N_2$	1-Methylpyrazole	82 062		127	0 993^{14}_{4}	828
608 1	$C_4H_6N_2$	3-Methylpyrazole	82 062			1 020	898
608 2	$C_4H_6N_2$	5-Methylpyrazole	82 062		204	1 022	
609	$C_4H_6N_2O_2$	Ethyl diazoacetate	114 062	−22	59^{12}	$1.085^{17\ 6}$	927
609 1	$C_4H_6N_2O_3S$	3-Methylpyrazole-4-sulfonic acid	162 22	258			1267
610	$C_4H_6N_4O_3$	Allantoin	158 08	235			1328
611	$C_4H_6N_4O_{12}$	Erythritol tetranitrate	302 08	61			
612	C_4H_6O	Methyl propargyl ether	70 046		62	0 $83^{12\ 5}$	
613	C_4H_6O	Vinyl ether $(CH_2.CH)_2O$	70 046		39		
614	C_4H_6O	Crotonaldehyde $CH_3CH.CHCHO$	70 046	−75	104	0 859^{14}_{4}	361
615	C_4H_6O	Dimethylketene $(CH_3)_2C{\cdot}CO$	70 046	−97 5	34 3		
616	$C_4H_6O_2$	Succinic dialdehyde $(CH_2CHO)_2$	86 046		57^{10}	1 064	290
617	$C_4H_6O_2$	*α*-Crotonic acid $CH_3CH{:}CHCO_2H$.	86 046	72	185	0 $964^{79\ 7}$	1112
619	$C_4H_6O_2$	*β*-Crotonic acid $CH_2{\cdot}C(CH_3)CO_2H$	86 046	14 6	171 9 d.	1 027	411
620	$C_4H_6O_2$	1-Methylacrylic acid	86.046	16	163	1.015	333
621	$C_4H_6O_2$	Trimethylenecarboxylic acid	86 046	17	182 5	1.088	
622	$C_4H_6O_2$	Vinylacetic acid $CH_2{:}CHCH_2CO_2H$	86 046	−39	163	1.013^{15}_{15}	849
623	$C_4H_6O_2$	Allyl formate $HCO_2C_3H_5$	86 046		83	0.948^{18}	
624	$C_4H_6O_2$	Methyl acrylate $CH_2{:}CHCO_2CH_3$	86 046		80 5	0.956^{18}	113
625	$C_4H_6O_2$	Diacetyl $CH_3COCOCH_3$	86 046		88	0 975	85
626	$C_4H_6O_3$	Acetic anhydride $(CH_3CO)_2O$.	102 046	−73 0	139 6	1.082	81
627	$C_4H_6O_3$	1-Ketobutyric acid $C_2H_5COCO_2H$	102 046	32	85^{21}		
628	$C_4H_6O_3$	Methyl pyruvate $CH_3COCO_2CH_3$	102 046		137	1 154^{0}	
629	$C_4H_6O_4$	Succinic acid $(CH_2CO_2H)_2$	118 046	185	235	1 562	1220
630	$C_4H_6O_4$	Isosuccinic acid $CH_3CH(CO_2H)_2$	118 046	135		1 455	
631	$C_4H_6O_4$	Dimethyl oxalate $(CO_2CH_3)_2$	118 046	54 0	163 3	1 120^{82}_{4}	1122
632	$C_4H_6O_4$	Ethyl hydrogen oxalate $HO_2CCO_2C_2H_5$.	118 046		117^{15}	1 218	
633	$C_4H_6O_5$	Diglycollic acid $O(CH_2CO_2H)_2$	134 05	148			
634	$C_4H_6O_5$	Glycollic anhydride $(CH_2OHCO)_2O$	131 05	130			
635	$C_4H_6O_5$	*l*-Malic acid $HO_2CCH_2CH(OH)CO_2H$	134 05	100	140 d.	1 595	
636	$C_4H_6O_5$	*dl*-Malic acid	134 05	129	150 d.	1 601	
637	$C_4H_6O_5$	Isomalic acid $CH_3C(OH)(CO_2H)_2$	134 05	160 d.			
638	$C_4H_6O_6$	Mesotartaric acid	150 05	140		1 666	1224
639	$C_4H_6O_6$	*d*-Tartaric acid	150 05	170		1 760	1222
640	$C_4H_6O_6$	*dl*-Tartaric acid	150 05	206		1.687	
641	$C_4H_6O_8$	Dihydroxytartaric acid	182 05	114			
642	C_4H_6S	Divinyl sulfide $(CH_2{\cdot}CH)_2S$	86 111		101	0 912	
643	C_4H_7Br	Vinylethyl bromide $CH_2{:}CHCH_2CH_2Br$	134 97		99 0		
644	C_4H_7BrO	Bromomethyl ethyl ketone	150 97		146		
645	$C_4H_7BrO_2$	1-Bromobutyric acid $C_2H_5CHBrCO_2H$	166 97	−4	115^{20}	1 574^{15}_{15}	
646	$C_4H_7BrO_2$	2-Bromobutyric acid	166 97	18	122^{16}		
647	$C_4H_7BrO_2$	3-Bromobutyric acid	166 97	32			
648	$C_4H_7BrO_2$	1-Bromoethyl acetate	166 97		63^{39}	1 4620	395
648.1	$C_4H_7BrO_2$	2-Bromoethyl acetate	166 97		70^{27}	1 5140	450
648 2	$C_4H_7BrO_2$	Ethyl bromoacetate $BrCH_2CO_2C_2H_5$	166 97		159	1 514^{18}_{4}	438
648 3	$C_4H_7BrO_2$	Methyl 1-bromopropionate	166 97		68 5^{48}	1 4917	436
648 4	$C_4H_7BrO_2$	Methyl 2-bromopropionate	166 97		79^{46}	1 5192	460
649	$C_4H_7Br_3$	1, 2, 3-Tribromobutane	294 80		113^{19}	2 190	752
650	$C_4H_7Br_3O$	1, 1, 1-Tribromo-*tert*-butyl alcohol	310 80	176			
651	C_4H_7ClO	Butyryl chloride C_3H_7COCl	106 51	−89 0	102	1.028	194
652	C_4H_7ClO	Isobutyryl chloride $(CH_3)_2CHCOCl$	106 51	-90 0	92	1 017	168
653	$C_4H_7ClO_2$	1-Chlorobutyric acid $C_2H_5CHClCO_2H$.	122 51		101 3^{15}		
654	$C_4H_7ClO_2$	*d*-2-Chlorobutyric acid	122 51	44	100^{13}		
655	$C_4H_7ClO_2$	*dl*-2-Chlorobutyric acid	122 51	16 5	116^{22}	1 186	386
656	$C_4H_7ClO_2$	3-Chlorobutyric acid	122.51	16	196^{22}	1 250^{10}	
657	$C_4H_7ClO_2$	1-Chloroethyl acetate	122 51		46^{45}	1 1124	190
657.1	$C_4H_7ClO_2$	2-Chloroethyl acetate	122 51		145	1.178^{0}	285
658	$C_4H_7ClO_2$	Ethyl chloroacetate $ClCH_2CO_2C_2H_5$.	122 51		144 2	1.159	267
659	$C_4H_7ClO_2$	Methyl 2-chloropropionate	122.51		148	1.187	
660	$C_4H_7ClO_2$	*n*-Propyl chloroformate $ClCO_2C_3H_7$	122 51		116	1 083^{25}_{25}	
661	$C_4H_7Cl_3O$	1, 2, 2-Trichloroethyl ethyl ether	177 43		170	1.330^{14}	
662	$C_4H_7Cl_3O$	1, 1, 1-Trichloro-*tert.*-butyl alcohol	177.43	97	166.4		

No	Formula	Name	Mol. wt	M. P.	B. P.	d	R. I. No.
663	$C_4H_7Cl_3O_2$	Chloral alcoholate $Cl_3CCHO.C_2H_5OH$	193.43	55	115	1.143^{40}	
664	$C_4H_7Cl_3O_2$	1, 1, 2-Trichlorobutyraldehyde hydrate	193.43	78		1.694^{4}	
665	$C_4H_7FO_2$	Ethyl fluoroacetate $FCH_2CO_2C_2H_5$	106.054			1.093	33
666	$C_4H_7IO_2$	Ethyl iodoacetate $ICH_2CO_2C_2H_5$	213.99		180	$1.817^{12.7}$	618
667	C_4H_7N	*n*-Butyronitrile C_3H_7CN	69.062	−112.6	118	0.794	47
668	C_4H_7N	Isobutyronitrile $(CH_3)_2CHCN$.	69.062		108		
669	C_4H_7N	Isopropylisocyanide $(CH_3)_2CHNC$	69.062		87	0.760	
670	C_4H_7N	Pyrroline	69.062		91	0.910	
671	C_4H_7NO	Acetonecyanhydrin $(CH_3)_2C(OH)CN$.	85.062	−19	82^{23}	0.932^{19}	117
672	C_4H_7NO	α-Pyrrolidone.	85.062	25	250.8	1.116	
673	$C_4H_7NO_2$	Diacetamide $NH(COCH_3)_2$.	101.062	78	223.5		
674	$C_4H_7NO_2$	Diacetylmonoxime $CH_3COC(:NOH)CH_3$	101.062	74	186		
675	$C_4H_7NO_2S$	Ethyl thiooxamate $H_2NCSCO_2C_2H_5$.	133.13	63			
676	$C_4H_7NO_3$	Acetylaminoacetic acid...	117.062	206			
677	$C_4H_7NO_3$	Diacetohydroxamic acid.	117.06	89			
678	$C_4H_7NO_3$	Ethyl oxamate $H_2NCO.CO_2C_2H_5$.. .	117.06	115			
679	$C_4H_7NO_4$	*l*-Aspartic acid	133.06	270		$1.661^{12.5}_{12.5}$	
679.1	$C_4H_7NO_7$	Nitrotetronic acid dihydrate . .	181.06	d. 184		1.684	1190
680	$C_4H_7NO_8$	Ammonium tetraoxalate .	197.06	130.5		1.607	
681	C_4H_7NS	Propyl isothiocyanate	101.127		153	0.991	
682	$C_4H_7N_3O$	Creatinine.	113.078	260 d.			
683	C_4H_8	Cyclobutane $(CH_2)_4$	56.062	−50	13	0.703^{0}_{4}	801
684	C_4H_8	1, 1-Dimethylethylene $CH_2:C(CH_3)_2$	56.062		−6		
685	C_4H_8	1, 2-Dimethylethylene $CH_3CH:CHCH_3$	56.062		1.4		
686	C_4H_8	Ethylethylene $C_2H_5CH:CH_2$	56.062	−130	−18	0.668^{0}	102
687	C_4H_8	Methylcyclopropane $(CH_2)_2CHCH_3$	56.062		5	0.691^{-20}	
688	$C_4H_8Br_2$	1, 2-Dibromobutane $C_2H_5CHBrCH_2Br$	215.89		166	1.820	
689	$C_4H_8Br_2$	1, 3-Dibromobutane.	215.89		174	1.807	632
690	$C_4H_8Br_2$	1, 4-Dibromobutane $Br(CH_2)_4Br$	215.89	−20	198 d.	1.79^{18}	
691	$C_4H_8Br_2$	2, 3-Dibromobutane $CH_3(CHBr)_2CH_3$.	215.89		158	1.83^{0}	
693	$C_4H_8Br_2$	1, 2-Dibromo-2-methylpropane	215.89	−70.3	149.0	1.759	639
694	$C_4H_8Br_2S$	Di-(1-bromoethyl) sulfide. ..	247.96		87^{16}	1.742	
695	$C_4H_8Cl_2$	1, 2-Dichloro-2-methylpropane.	126.98		108		
696	$C_4H_8Cl_2O$	2-Chloroethyl ether $(ClCH_2CH_2)_2O$	142.98		178	1.213^{20}_{20}	461
697	$C_4H_8Cl_2O$	1, 2-Dichloroethyl ethyl ether	142.98		145	1.174^{23}	
697.1	$C_4H_8Cl_2O_2$	Dichlorobutylene glycol	158.98	126			1177
698	$C_4H_8Cl_2S$	Di-(1-chloroethyl) sulfide... ..	159.04		67.5^{27}	1.199^{14}_{4}	
699	$C_4H_8Cl_2S$	Di-(2-chloroethyl) sulfide $(CH_3CHCl)_2S$	159.04	13.5	120^{34}	1.285^{16}_{4}	701
700	$C_4H_8Cl_2OS$	Di-(2-chloroethyl) sulfoxide	175.04	110	140^{26} d.		
701	$C_4H_8Cl_2O_2S$	Di-(2-chloroethyl) sulfone.	191.04	53.5	181^{16}		
702	$C_4H_8N_2$ '	2-Methyl-4, 5-dihydroimidazole .	84.078	106	198		
703	$C_4H_8N_2O_2$	1-Acetyl-2-methylurea ...	116.08	180			
704	$C_4H_8N_2O_2$	Dimethyloxamide $(CONHCH_3)_2$	116.08	210			
705	$C_4H_8N_2O_2$	Dimethylglyoxime . . .	116.08	246			
706	$C_4H_8N_2O_2$	Succinamide $(CH_2CONH_2)_2$	116.078	243			
707	$C_4H_8N_2O_3$	Ethyl allophanate $H_2NCONHCO_2C_2H_5$	132.08	192			
708	$C_4H_8N_2O_3$	*l*-Asparagine..	132.08	226	235 d.	1.543^{15}_{4}	1254
709	$C_4H_8N_2O_4$	*d*-Tartaramide $[CH(OH)CONH_2]_2$	148.08	195			
710	$C_4H_8N_2S$	Allylthiourea $CH_2:CHCH_2NHCONH_2$	116.143	78.4		1.219^{20}_{20}	
711	C_4H_8O	Crotonyl alcohol $CH_3CH:CHCH_2OH$.	72.062	> −30	118	0.854	276
712	C_4H_8O	Cyclobutanol $(CH_2)_3CHOH$	72.062		124.1	0.923^{16}_{16}	343
713	C_4H_8O	Cyclopropyl carbinol $(CH_2)_2CHCH_2OH$	72.062		124.3	0.899	850
714	C_4H_8O	Vinylethyl alcohol $CH_2:CHCH_2CH_2OH$	72.062		114	0.856^{0}	
715	C_4H_8O	Methyl allyl ether $CH_2:CHCH_2OCH_3$	72.062		46	0.77^{11}	
716	C_4H_8O	Vinyl ethyl ether $CH_2:CHOC_2H_5$	72.062		35.5	$0.763^{14.5}_{17.5}$	
717	C_4H_8O	*n*-Butyraldehyde C_3H_7CHO	72.062	−99.0	75.7	0.817	50
718	C_4H_8O	Isobutyraldehyde $(CH_3)_2CHCHO$	72.062	−65.9	61	0.794	30
719	C_4H_8O	Methyl ethyl ketone $CH_3COC_2H_5$	72.062	−86.4	79.6	0.805	40
720	$C_4H_8O_2$	Erythrol................	88.062		106.5	1.047	
721	$C_4H_8O_2$	Methylacetyl carbinol (Acetoin)	88.062	15	142	1.002^{18}_{4}	303
722	$C_4H_8O_2$	2-Hydroxybutyraldehyde (Aldol)	88.062		83^{20}	1.103	
723	$C_4H_8O_2$	*n*-Butyric acid $C_3H_7CO_2H$ . .	88.062	−7.9	163.5	0.959	109
724	$C_4H_8O_2$	Isobutyric acid $(CH_3)_2CHCO_2H$	88.062	−47.0	154.4	0.949	88

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No
725	$C_4H_8O_2$	Ethyl acetate $CH_3COC_2H_5$	88.062	−83.6	77.1	0.899	29
726	$C_4H_8O_2$	Methyl propionate $C_2H_5CO_2CH_3$	88.062	−87.5	79.9	0.917	36
727	$C_4H_8O_2$	*n*-Propyl formate $HCO_2C_3H_7$	88.062	−92.9	81.3	0.901	35
728	$C_4H_8O_2$	Isopropyl formate $HCO_2CH(CH_3)_2$.	88.062		71.3	0.883^0	
729	$C_4H_8O_3$	Ethoxyacetic acid $C_2H_5OCH_2CO_2H$	104.062		206		
730	$C_4H_8O_3$	1-Hydroxybutyric acid	104.062	42.5	260		
731	$C_4H_8O_3$	1-Hydroxyisobutyric acid	104.062	79	212		
732	$C_4H_8O_3$	2-Hydroxybutyric acid	104.062		130^{14}		
733	$C_4H_8O_3$	Ethyl glycollate $HOCH_2CO_2C_2H_5$	104.062		160	1.083^{22}	
734	$C_4H_8O_3$	Glycol acetate $HOCH_2CH_2OCOCH_3$	104.062		182		
735	$C_4H_8O_3$	Methylethyl carbonate $CH_3(C_2H_5)CO_3$	104.062	−14.5	109.2	1.002^{27}	
736	$C_4H_8O_3$	Methyl hydracrylate.	104.062		79^{12}	1.118	336
737	$C_4H_8O_3$	Methyl lactate $CH_3CH(OH)CO_2CH_3$	104.062		144.8	1.08^{16}	883
738	$C_4H_8O_4$	1, 2-Dihydroxybutyric acid.	120.06	75			
739	$C_4H_8O_4$	*d*-Methyl glycerinate	120.06		120^{14}	1.280^{15}_{15}	
740	$C_4H_8S_2$	Diethylene disulfide	120.192	112	200		
741	C_4H_9Br	*n*-Butyl bromide C_4H_9Br	136.99	−112.4	101.6	1.275	372
742	C_4H_9Br	Isobutyl bromide $(CH_3)_2CHCH_2Br$	136.99	−118.5	91.5	1.264	352
743	C_4H_9Br	*sec.*-Butyl bromide $C_2H_5CHBrCH_3$.	136.99		91.3	1.251^{25}_4	347
744	C_4H_9Br	*tert*-Butyl bromide $(CH_3)_3CBr$	136.99	−20	73.3	1.222	309
745	C_4H_9BrO	2-Bromoethyl ethyl ether	152.99		128.2	1.370^0	
746	C_4H_9Cl	*n*-Butyl chloride C_4H_9Cl	92.527	−123.1	78.0	0.884	132
747	C_4H_9Cl	Isobutyl chloride $(CH_3)_2CHCH_2Cl$	92.527	−131.2	68.9	0.875	98
748	C_4H_9Cl	*sec*-Butyl chloride $C_2H_5CHClCH_3$	92.527		68	0.871	110
749	C_4H_9Cl	*tert.*-Butyl chloride $(CH_3)_3CCl$	92.527	−28.5	51.0	0.840	60
751	C_4H_9ClO	1-Chloroethyl ethyl ether	108.527		98		
752	C_4H_9ClO	*tert*-Butyl hypochlorite $(CH_3)_3COCl$.	108.527		80	0.958	
753	C_4H_9ClS	2-Chloroethyl ethyl sulfide	124.59		157		
754	C_4H_9I	*n*-Butyl iodide C_4H_9I	184.00	−103.5	127	1.617	600
755	C_4H_9I	Isobutyl iodide $(CH_3)_2CHCH_2I$	184.00	−93.5	120.4	1.605	578
756	C_4H_9I	*sec.*-Butyl iodide $C_2H_5CHICH_3$	184.00	−104.0	117.5	1.595	
757	C_4H_9IO	2-Iodoethyl ethyl ether $C_2H_5OCH_2CH_2I$	200.00		155	1.670	
758	C_4H_9N	Crotonylamine $CH_3CH\ CHCH_2NH_2$	71.077		81		
759	C_4H_9N	Tetrahydropyrrole (Pyrrolidine)	71.077		88.5	0.871^{10}	
760	C_4H_9NO	*n*-Butyramide $C_3H_7CONH_2$	87.077	116	216	1.032	
761	C_4H_9NO	Isobutyramide $(CH_3)_2CHCONH_2$	87.077	129	220	1.013	
762	C_4H_9NO	*N*-Dimethylacetamide $CH_3CON(CH_3)_2$.	87.077		165.7	0.943	365
763	C_4H_9NO	*N*-Ethylacetamide $CH_3CONHC_2H_5$	87.077		205	0.942	
764	C_4H_9NO	Methyl ethyl ketoxime	87.077		152	0.923	393
765	$C_4H_9NO_2$	Iminoethyl alcohol $HN(CHCH_2O_2H)_2$	103.077	28	270		
766	$C_4H_9NO_2$	1-Aminobutyric acid	103.077	285			
767	$C_4H_9NO_2$	2-Aminobutyric acid	103.077	184			
768	$C_4H_9NO_2$	3-Aminobutyric acid	103.08	193			
769	$C_4H_9NO_2$	1-Aminoisobutyric acid	103.077		280		
770	$C_4H_9NO_2$	Ethylaminoacetic acid	103.08	> 160			
771	$C_4H_9NO_2$	Propyl carbamate $C_3H_7OCONH_2$	103.077	53	200		
772	$C_4H_9NO_2$	*n*-Butyl nitrite C_4H_9ONO	103.077		75	0.911^0	
773	$C_4H_9NO_2$	Isobutyl nitrite $(CH_3)_2CHCH_2ONO$	103.077		67	0.877^{16}	28
773.1	$C_4H_9NO_2$	Methy urethane $CH_3NHCO_2C_2H_5$.	103.077		170	$1.009^{18.9}_4$	950
774	$C_4H_9NO_3$	*n*-Butyl nitrate $C_4H_9ONO_2$	119.077		136	1.048^0	
775	$C_4H_9NO_3$	Isobutyl nitrate $(CH_3)_2CHCH_2ONO_2$	119.077		122.9	1.014^{25}_{25}	137
776	$C_4H_9NO_5$	*d*-Ammonium hydrogen malate	151.077	170			1205
777	$C_4H_9NO_5$	*l*-Ammonium hydrogen malate	151.077	161		1.509	
778	$C_4H_9NO_6$	Ammonium hydrogen tartrate	167.077	d.		1.680	1241
779	C_4H_9NS	1, 4-Thiazan	103.142		169		
780	$C_4H_9N_3O_2$	Creatine	131.093	295			
781	$C_4H_{10}ClNO_2$	Ethylaminoacetic acid hydrochloride.	139.54	144			
781.1	C_4H_{10}	*n*-Butane $CH_3CH_2CH_2CH_3$	58.077	−135.0	0.6	0.601^0 (liq.)	
781.2	C_4H_{10}	Trimethylmethane (Isobutane)	58.077	−145.0	−10.2		
782	$C_4H_{10}N_2$	Diethylenediamine (Piperazine)	86.093	105.6	146		1156
783	$C_4H_{10}N_2O$	Nitrosodiethylamine $(C_2H_5)_2NNO$.	102.093		175.4	$0.951^{17.5}$	
784	$C_4H_{10}N_2O$	Trimethylurea $(CH_3)_2NCONHCH_3$.	102.093	75.5	232.5		
785	$C_4H_{10}N_2S$	Propylthiourea $C_3H_7NHCSNH_2$.	118.16	110			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
786	$C_4H_{10}N_3O_3$	Guanidine lactate	132.10	d.			1236
788	$C_4H_{10}N_4S_2$	Ethylenediamine thiocyanate	178.24				1285
789	$C_4H_{10}O$	*n*-Butyl alcohol C_4H_9OH	74.077	−89.8	117.7	0.810	116
790	$C_4H_{10}O$	Isobutyl alcohol $(CH_3)_2CHCH_2OH$	74.077	−108	107.3	0.802	99
791	$C_4H_{10}O$	*sec.*-Butyl alcohol $C_2H_5CH(OH)CH_3$	74.077		99.5	0.808	104
792	$C_4H_{10}O$	*tert.*-Butyl alcohol $(CH_3)_3COH$..	74.077	25.5	82.8	0.789	64
793	$C_4H_{10}O$	Ether $(C_2H_5)_2O$ . ..	74.077	α −116.3 β −123.3	34.5	0.714	7
794	$C_4H_{10}O$	Methyl propyl ether $CH_3OC_3H_7$..	74.077		38.9	0.738	13
794.1	$C_4H_{10}O$	Methyl isopropyl ether .	74.077		32.5^{777}	0.735^{20}_{20}	12
795	$C_4H_{10}O_2$	1, 4-Dihydroxybutane $(CH_2CH_2OH)_2$	90.077	16	230	1.020	
796	$C_4H_{10}O_2$	2, 3-Dihydroxybutane $(CH_3CHOH)_2$	90.077		184	1.048^{0}	
797	$C_4H_{10}O_2$	1, 2-Dihydroxy-2-methylpropane	90.077		177	1.003	
798	$C_4H_{10}O_2$	Glycol dimethyl ether $(CH_3OCH_2)_2$	90.077		84.5	0.873	
799	$C_4H_{10}O_2$	Glycol ethyl ether $HOCH_2CH_2OC_2H_5$	90.077		135.3	0.935	
800	$C_4H_{10}O_2$	Diethyl peroxide $(C_2H_5O)_2$ . .	90.077		65	0.827	
801	$C_4H_{10}O_2$	Dimethyl acetal $CH_3CH(OCH_3)_2$	90.077		64.4	0.866	
802	$C_4H_{10}O_2S$	Ethyl sulfone $(C_2H_5)_2SO_2$.... . .	122.142	70	248	1.357	
803	$C_4H_{10}O_2S_2$	Diethyl disulfoxide $C_2H_5(SO)_2C_2H_5$.	154.21		140 d.	1.24	
804	$C_4H_{10}O_3$	1, 2, 3-Trihydroxybutane.....	106.077		136^{28}	1.232^{17}	
805	$C_4H_{10}O_3$	Di-(2-hydroxyethyl) ether ..	106.077		250	1.132	
806	$C_4H_{10}O_3$	Glycerol 1-methyl ether. . .	106.077		197	1.270^{25}_{25}	
807	$C_4H_{10}O_3S$	Diethyl sulfite $(C_2H_5)_2SO_3$	138.14		161.3	1.077	811
808	$C_4H_{10}O_4$	*dl*-Erythritol $HOCH_2(CHOH)_2CH_2OH$	122.08	126	331	1.451	1174
809	$C_4H_{10}O_4S$	Diethyl sulfate $(C_2H_5O)_2SO_2$.	154.14	−26.0	208 s. d	1.172^{25}_{4}	78
810	$C_4H_{10}S$	*n*-Butyl mercaptan C_4H_9SH	90.142	> −74	98	0.836^{20}	
811	$C_4H_{10}S$	Isobutyl mercaptan $(CH_3)_2CHCH_2SH$	90.142	< −79	88	0.836	368
812	$C_4H_{10}S$	*sec.*-Butyl mercaptan $C_2H_5CH(SH)CH_3$	90.142		85	0.830^{17}	
813	$C_4H_{10}S$	*tert.*-Butyl mercaptan $(CH_3)_3CSH$	90.142		67		
814	$C_4H_{10}S$	Ethyl sulfide $(C_2H_5)_2S$	90.142	−102.1	91.6	0.837	390
815	$C_4H_{10}S_2$	Ethyl disulfide $(C_2H_5S)_2$.	122.21		153.5	0.993	630
816	$C_4H_{10}Se$	Ethyl selenide $(C_2H_5)_2Se$	137.28		108	$1.230^{27.5}_{4}$	1035
817	$C_4H_{10}Te$	Ethyl telluride $(C_2H_5)_2Te$..	185.58		138		
818	$C_4H_{11}AsO_2$	Diethylarsonic acid $(C_2H_5)_2AsO(OH)$.	166.05	190			
819	$C_4H_{11}AsO_3$	N-Butylarsonic acid $C_4H_9AsO(OH)_2$	182.05	159			
820	$C_4H_{11}N$	*n*-Butylamine $C_4H_9NH_2$.....	73.093	−50.5	76	0.740^{20}	131
821	$C_4H_{11}N$	Isobutylamine $(CH_3)_2CHCH_2NH_2$	73.093	−85.5	68	0.736	111
822	$C_4H_{11}N$	*sec.*-Butylamine $C_2H_5CH(NH_2)CH_3$	73.093	−104.5	63	0.718^{20}	93
823	$C_4H_{11}N$	*tert.*-Butylamine $(CH_3)_3CNH_2$	73.093	−67.5	43.8	0.696	39
824	$C_4H_{11}N$	Diethylamine $(C_2H_5)_2NH$	73.093	−50.0	56.0	0.711	65
825	$C_4H_{11}P$	Diethylphosphine $(C_2H_5)_2PH$	90.109		85		
826	$C_4H_{12}As_2$	Cacodyl $(CH_3)_2As.As(CH_3)_2$	210.01	−6	170	> 1	
827	$C_4H_{12}As_2O$	Cacodylic oxide $[(CH_3)_2As]_2O$	226.01	−25	120	1.462^{15}	
828	$C_4H_{12}As_2S$	Cacodylic sulfide $[(CH_3)_2As]_2S$	242.08		211		
829	$C_4H_{12}BrN$	Tetramethylammonium bromide	154.02			1.56	
830	$C_4H_{12}BrNO$	Diethylbromoacetamide...	170.02	67			
831	$C_4H_{12}ClN$	Diethylamine hydrochloride	109.56	217	330	1.048	
832	$C_4H_{12}ClN$	Tetramethylammonium chloride	109.56			1.169	
833	$C_4H_{12}N_2$	Tetramethylenediamine....	88.108	27	158		
834	$C_4H_{12}N_2O_4$	Ammonium succinate	152.11			1.367^{10}	
835	$C_4H_{12}N_2O_6$	Ammonium *d*-tartrate .	184.11	d.		1.608	1253
835.1	$C_4H_{12}N_2O_6$	Ammonium *dl*-tartrate.......	184.11			1.601	1323
836	$C_4H_{12}N_4$	Tetramethylammonium trinitride	116.124	125 d.			
837	$C_4H_{12}OS$	Dimethylethylsulfonium hydroxide	108.15	−99.5	93	0.837	
838	$C_4H_{13}NO$	Tetramethylammonium hydroxide	91.108	63	d.		
839	$C_4H_{16}N_6O_4S$	Methylguanidine sulfate .	244.24	240			
840	$C_5HCl_3N_4$	2, 6, 8-Trichloropurine.........	223.41	187			
841	C_5HCl_4N	2, 3, 4, 5-Tetrachloropyridine	216.85	21	137^{24}		
842	C_5HCl_4N	2, 3, 4, 6-Tetrachloropyridine	216.85	75	135^{20}		
843	C_5HCl_4N	2, 3, 5, 6-Tetrachloropyridine	216.85	91	130^{20}		
844	$C_5H_2Cl_3N$	2, 3, 5-Trichloropyridine.....	182.40	50	120^{16}		
845	$C_5H_3Cl_2N$	3, 5-Dichloropyridine.......... .	147.95	67			
846	$C_5H_3N_3$	1, 1, 1-Tricyanoethane $CH_3C(CN)_3$. . .	105.05	93.5		0.760	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
847	C_5H_4BrN	3-Bromopyridine	157.96		173	1.632^{10}	
848	C_5H_4ClN	2-Chloropyridine	113.50		167.5	1.205^{16}	
849	C_5H_4ClN	3-Chloropyridine	113.50		148.5		
850	C_5H_4ClN	4-Chloropyridine	113.50		148		
851	$C_5H_4N_2$	Glutaconic nitrile $NCCH_2CH:CHCN$	92.047	31.5	130^{12}		
852	$C_5H_4N_2O_2$	3-Nitropyridine	124.05	41	216		
853	$C_5H_4N_2O_4$	Methylalloxan	156.05	156 d.			
853.1	$C_5H_4N_2O_4\ (H_2O)$	3, 5-Pyrazoledicarboxylic acid	156.05			1.626	1239
854	$C_5H_4N_4$	Purine	120.06	217			
855	$C_5H_4N_4O$	Hypoxanthine	136.06	> 150			
857	$C_5H_4N_4O_3$	Uric acid	168.06	d.		1.893	
858	C_5H_4OS	Thiophene-2-aldehyde	112.10		198	1.215	
859	$C_5H_4O_2$	Furfural	96.031	−38.7	161.7	1.159	685
860	$C_5H_4O_2$	1, 4-Pyrone	96.031	32.5	217.7	$1.190^{40.3}$	1063
861	$C_5H_4O_2S$	Thiophene-2-carboxylic acid	128.10	126.5	260 d.		
862	$C_5H_4O_2S$	Thiophene-3-carboxylic acid	128.10	136			
863	$C_5H_4O_3$	Citraconic anhydride	112.03	7	228	1.245	508
864	$C_5H_4O_3$	Glutaconic anhydride	112.03	87	152^{15}		
865	$C_5H_4O_3$	Itaconic anhydride	112.03	68			
866	$C_5H_4O_3$	Pyromeconic acid	112.03	117	228		
867	$C_5H_4O_3$	Pyromucic acid	112.03	133			
868	$C_5H_4O_4$	Aconic acid	128.03	164			1324
869	$C_5H_4O_4$	Glutinic acid $HO_2CC:CCH_2CO_2H$	128.03	146			
870	C_5H_5N	Pyridine	79.047	−42	115.3	0.982	641
871	C_5H_5NO	2-Hydroxypyridine	95.047	107	281		
872	C_5H_5NO	3-Hydroxypyridine HOC_5H_4N	95.047	129			
873	C_5H_5NO	4-Hydroxypyridine	95.047	148.5			
874	C_5H_5NO	Pyrrole-2-aldehyde $CHOC_4H_4N$	95.047	47			
875	$C_5H_5NO_2$	2, 4-Dihydroxypyridine $(HO)_2C_5H_3N$.	111.05	265			
876	$C_5H_5NO_2$	2, 6-Dihydroxypyridine $(HO)_2C_5H_3N$.	111.05	195			
877	$C_5H_5NO_2$	Pyrrole-2-carboxylic acid $HO_2C.C_4H_4N$.	111.05	191.5			
878	$C_5H_5NO_3$	2, 4, 6-Trihydroxypyridine	127.05	230 d.			
879	$C_5H_5N_5$	Adenine	135.08	365			
880	C_5H_6	Cyclopentadiene	66.046		42.5	0.805	903
881	C_5H_6	2-Methyl-1, 3-butenine (Valylene)	66.046		50		
882	$C_5H_6N_2$	2-Aminopyridine	94.062	56	204		
883	$C_5H_6N_2$	3-Aminopyridine	94.062	64	252		
884	$C_5H_6N_2$	4-Aminopyridine $H_2NC_5H_4N$	94.062	157			
886	$C_5H_6N_2$	Glutaric nitrile $NC(CH_2)_3NC$	94.062	−29	287.4	0.995^{15}	1007
887	$C_5H_6N_2O$	2-Hydroxyglutaric nitrile	110.06		203^{11}	1.181	534
888	$C_5H_6N_2O_2$	Thymine	126.06	335 d.			
889	$C_5H_6N_2O_3$	Dimethylparabanic acid	142.06	145	277		
890	$C_5H_6N_2O_3$	Pyridine nitrate	142.06				1333
891	C_5H_6O	2-Methylfurfuran	82.046		64.3	0.916	
892	C_5H_6OS	Thiophene-2-alcohol	114.11		207		
893	$C_5H_6O_2$	Furfuryl alcohol	98.046		170.2	1.136	996
894	$C_5H_6O_2$	Pentinoic acid	98.046	103			
895	$C_5H_6O_2$	Ethyl propiolate $CH:CCO_2C_2H_5$	98.046		119.5	0.968^{15}_{15}	
896	$C_5H_6O_2$	Propargyl acetate $CH.CCH_2O_2CCH_3$	98.046		125	1.005	252
897	$C_5H_6O_3$	Glutaric anhydride	114.05	57	287		
898	$C_5H_6O_4$	Citraconic acid $CH_3C(CO_2H):CHCO_2H$	130.05	91		1.617	
899	$C_5H_6O_4$	Glutaconic acid	130.05	134			
900	$C_5H_6O_4$	Itaconic acid $CH_2:C(CO_2H)CH_2CO_2H$.	130.05	161 d.		1.632	
901	$C_5H_6O_4$	Mesaconic acid $CH_3(CO_2H)C:CHCO_2H$	130.05	202	250		
902	$C_5H_6O_4$	Paraconic acid	130.05	58			
903	$C_5H_6O_4$	Trimethylene-1, 1-dicarboxylic acid	130.05	175	210^{30}		
904	$C_5H_6O_5$	Acetone-1-1′-dicarboxylic acid	146.05	135 d.			
905	$C_5H_6O_5$	1-Ketoglutaric acid	146.05	113			
906	$C_5H_6N_2O_3$	1-Methylbarbituric acid	142.06	132			
907	$C_5H_7Cl_3O_2$	Chloral acetone	205.43	76			
908	C_5H_7N	1-Methylpyrrole	81.062		115.4	0.911	892
909	C_5H_7N	2-Methylpyrrole	81.062		148	0.945	
910	C_5H_7N	3-Methylpyrrole.	81.062		143		

No	Formula	Name	Mol. wt	M. P.	B. P.	d	R. I. No.
911	$C_5H_7NO_2$	Ethyl cyanoacetate $NCCH_2CO_2C_2H_5$	113.06	−22.5	206	1.063	**232**
912	C_5H_7NS	Crotonyl isothiocyanate	113.13		85^{50}	0.993^{0}	
913	C_5H_8	Cyclopentene.......	68.062		43.6	0.776	
914	C_5H_8	2, 3-Pentadiene $CH_3CH:C:CHCH_3$	68.082		51	0.702	
915	C_5H_8	*unsym.*-Dimethylallene $(CH_3)_2C:C:CH_2$	68.062	−120	40.5	0.678	
916	C_5H_8	Isoprene $CH_2:C(CH_3)CH:CH_2$	68.062	−120	34	0.679	**943**
917	C_5H_8	Methylethylacetylene $CH_3C:CC_2H_5$	68.062		56	0.687	**121**
918	C_5H_8	1, 3-Pentadiene $CH_3CH:CHCH:CH_2$	68.062		44	0.696	**901**
920	C_5H_8	Propylacetylene $C_3H_7C:CH$	68.062	−95	40	0.722^{0}	**932**
921	C_5H_8	Isopropylacetylene $(CH_3)_2CHC:CH$	68.062		29.3	0.685^{0}	
921.1	$C_5H_8Cl_2O_2$	Ethyl 1, 2-dichloropropionate	170.98		184	1.246	**424**
921.2	$C_5H_8N_2$	3, 4-Dimethylpyrazole..	96.078	58		$0.933^{99.3}_{4}$	**1131**
922	$C_5H_8N_2$	3, 5-Dimethylpyrazole	96.078	107	220		
923	$C_5H_8N_4O_6$	Uroxanic acid ..	220.09	162 d			
924	C_5H_8O	Cyclopentanone .	84.062		130.6	0.951	**353**
925	C_5H_8O	Ethyl propargyl ether $CH:CCH_2OC_2H_5$	84.062		80	0.833	**325**
926	C_5H_8O	Tiglic aldehyde $CH_3CH:C(CH_3)CHO$	84.062		116.5	0.870	**430**
927	C_5H_8O	Ethylideneacetone $CH_3CH:CHCOCH_3$	84.062		124	0.856	**370**
928	$C_5H_8O_2$	Levulinic aldehyde.	100.062		188	1.018	**295**
929	$C_5H_8O_2$	Acetylacetone $CH_3COCH_2COCH_3$	100.062	−23.2	137	0.976	**439**
930	$C_5H_8O_2$	Allylacetic acid $CH_2:CH(CH_2)_2CO_2H$	100.062	< −18	189	0.984	**805**
931	$C_5H_8O_2$	Angelic acid	100.062	45	185	$0.983^{46.7}$	**1069**
932	$C_5H_8O_2$	2, 2-Dimethylacrylic acid	100.062	70	195		
933	$C_5H_8O_2$	1-Ethylacrylic acid $CH_2:C(C_2H_5)CO_2H$	100.062	45	180		
934	$C_5H_8O_2$	1, 2-Pentenic acid $C_2H_5CH:CHCO_2H$ ..	100.062	10	108^{17}	0.990	**904**
935	$C_5H_8O_2$	2, 3-Pentenic acid	100.062		95^{16}	0.987	**949**
936	$C_5H_8O_2$	Tiglic acid $CH_3CH:C(CH_3)CO_2H$	100.062	64	198.5	0.872	**1121**
937	$C_5H_8O_2$	Allyl acetate $CH_3CO_2C_3H_5$	100.062		105	0.928	**146**
938	$C_5H_8O_2$	Ethyl acrylate $C_2H_3COC_2H_5$	100.062		99.8	0.924	
939	$C_5H_8O_2$	Methyl α-crotonate	100.062		120.7	0.981^{4}	
941	$C_5H_8O_3$	Levulinic acid $CH_3COCH_2CH_2CO_2H$	116.06	33.1	246	1.143^{17}	**383**
942	$C_5H_8O_3$	Ethyl pyruvate $CH_3COCO_2C_2H_5$	116.06		144	1.060^{16}_{4}	**882**
943	$C_5H_8O_3$	Methyl acetoacetate	116.06		170	1.077	**241**
944	$C_5H_8O_4$	Dimethylmalonic acid $(CH_3)_2C(CO_2H)_2$	132.06	193			
945	$C_5H_8O_4$	Ethylmalonic acid $C_2H_5CH(CO_2H)_2$	132.06	111.5	160 d		
946	$C_5H_8O_4$	Glutaric acid $CH_2(CH_2CO_2H)_2$	132.06	97.5	304	1.192^{100}	**1151**
947	$C_5H_8O_4$	Pyrotartaric acid	132.06	111		1.411	**1333**
947.1	$C_5H_8O_4$	Methyltetronic lactone	132.06	123			**1213**
948	$C_5H_8O_4$	Dimethyl malonate $H_2C(CO_2CH_3)_2$	132.06	−62	181.5	1.154	**206**
949	$C_5H_8O_4$,	Ethyl hydrogen malonate.	132.06		147^{21}	1.176	**301**
950	$C_5H_8O_4$	Methyl ethyl oxalate	132.06		173.7	1.156^{0}	
951	$C_5H_8O_4$	Methylene diacetate $CH_2(CO_2CH_3)_2$	132.06		170		
952	$C_5H_8O_5$	α-Citramalic acid	148.06	95			
953	$C_5H_8O_5$	*dl*-Citramalic acid .	148.06	117			
954	$C_5H_8O_5$	β-Methylmalic acid	148.06	123			
955	$C_5H_8O_5$	Arabonic lactone .	148.06	98			
956	$C_5H_8O_5$	Dimethyl tartronate	148.06	53.3			
957	$C_5H_8O_6$ (H_2O)	*d*-Methyl hydrogen tartrate	164.06	76			
958	$C_5H_8O_7$	Aposorbinic acid	180.06	110			
959	$C_5H_9BrO_2$	1-Bromovaleric acid $C_3H_7CHBrCO_2H$	180.99		105^{10}		
960	$C_5H_9BrO_2$	2-Bromovaleric acid	180.99	60			
961	$C_5H_9BrO_2$	3-Bromovaleric acid	180.99	40			
962	$C_5H_9BrO_2$	2-Bromoisovaleric acid	180.99	73.5			
963	$C_5H_9BrO_2$	Ethyl 1-bromopropionate	180.99		160	1.393	**419**
964	$C_5H_9Br_3$	1, 2, 3-Tribromopentane	308.82		128^{21}	2.095^{14}_{4}	**743**
965	C_5H_9Cl	Isoprene hydrochloride	104.53		109	0.933	
966	C_5H_9ClO	*n*-Valeryl chloride C_4H_9COCl .	120.53		128	1.016^{15}	**223**
967	C_5H_9ClO	Isovaleryl chloride $(CH_3)_2CHCH_2COCl$	120.53		113		
968	$C_5H_9ClO_2$	Ethyl 1-chloropropionate	136.53		146	1.087	**235**
969	$C_5H_9ClO_2$	Ethyl 2-chloropropionate	136.53		162.5	1.114	**236**
969.1	$C_5H_9ClO_2$	*n*-Butyl chloroformate $ClCO_2C_4H_7$	136.53		138.9	1.078	**807**
970	$C_5H_9ClO_2$	Isobutyl chloroformate	136.53		130	1.040^{25}_{25}	
971	$C_5H_9IO_2$	Ethyl 2-iodopropionate .	228.00		202	1.679^{15}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No
972	C_5H_9N	*n*-Valeryl nitrile C_4H_9CN	83.077		141	0.801	82
973	C_5H_9N	Isovaleryl nitrile $(CH_3)_2CHCH_2CN$	83 077		129.3	0.802	
974	C_5H_9NO	Piperidone	99.077	40	256		
975	$C_5H_9NO_3$	Acetylurethane $CH_3CONHCO_2C_2H_5$	131.08	78	215		
975 1	$C_5H_9NO_3$	*α*-Acetylaminopropionic acid	131 08	133			1215
976	$C_5H_9NO_4$	*dl*-Glutaminic acid	147.08	198		1.460	1261
977	$C_5H_9NO_4$	*d*-Glutaminic acid	147 08	208 d.		1.538	1266
978	C_5H_9NS	Isobutyl isothiocyanate	115.14		162	0.943	
979	C_5H_{10}	Cyclopentane $CH_2<(CH_2CH_2)_2>$	70 077	−93 3	49.5	0.754	843
980	C_5H_{10}	1, 1-Dimethyltrimethylene	70 077		21	0.660	
981	C_5H_{10}	Methylcyclobutane	70 077		42		
982	C_5H_{10}	*β*-Amylene $CH_3CH\ CHC_2H_5$	70 077	−139	36 4	0 651	921
983	C_5H_{10}	*α*-Amylene $C_2H_5C(CH_3){:}CH_2$	70 077		32	0.667_0^0	880
984	C_5H_{10}	*n*-Propylethylene $C_3H_7CH{:}CH_2$	70 077		40		31
985	C_5H_{10}	2-Methyl-3-butene $CH_2{:}CHCH(CH_3)_2$	70 077	−135	20 1	$0\ 632^{15}$	
986	C_5H_{10}	2-Methyl-2-butene $CH_3CH{:}C(CH_3)_2$	70 077	−124	38 4	$0\ 668^{13}$	
987	$C_5H_{10}Br_2$	1, 5-Dibromopentane $CH_2(CH_2CH_2Br)_2$	229 91	−35	224	1.706^{18}	
988	$C_5H_{10}Br_2$	2, 3-Dibromopentane $C_2H_5(CHBr)_2CH_3$	229.91		175	1.7087^0	866
988 1	$C_5H_{10}ClNO_4$	*d*(*l*)-Glutamine acid hydrochloride	183.54	193			1240
989	$C_5H_{10}Cl_2$	3, 3-Dichloro-2-methylbutane	140 99		145	1 065	
990	$C_5H_{10}Cl_2$	1, 4-Dichloropentane	140 99		61^{17}		
991	$C_5H_{10}Cl_2$	1, 5-Dichloropentane $CH_2(CH_2CH_2Cl)_2$	140.99		178		
992	$C_5H_{10}Cl_2$	2, 3-Dichloropentane $C_2H_5(CHCl)_2CH_3$	140.99		139		
993	$C_5H_{10}N_2$	Diethylcyanamide $NCN(C_2H_5)_2$	98 093		187 d.	0 854	1072
994	$C_5H_{10}N_2O_2$	1-Nitropiperidine	130 09	−5.5	245	1 158	1033
994.1	$C_5H_{10}N_2O_2$	Dimethylmalonamide	130 09	198			1208
995	$C_5H_{10}N_2O_3$	*dl*-Glutamine	146 09	256			
996	$C_5H_{10}N_2O_4$	Amylene nitrosate	162 09	99			1207
997	$C_5H_{10}O$	Cyclopentanol	86.077		141	0 946	
998	$C_5H_{10}O$	Methylallyl carbinol	86.077		116 4	0 834	
999	$C_5H_{10}O$	Vinylethyl carbinol	86 077		114 7	0 837	277
1000	$C_5H_{10}O$	2-Pentene-1-ol	86 077		64^{62}	0.838	933
1001	$C_5H_{10}O$	Ethyl allyl ether $C_2H_5OCH_2CH{:}CH_2$	86 077		67 6	0 765	69
1002	$C_5H_{10}O$	Isovaleraldehyde $(CH_3)_2CHCH_2CHO$	86 077	−51	92 5	$0\ 803^{17}$	79
1003	$C_5H_{10}O$	Trimethylacetaldehyde $(CH_3)_3CCHO$	86 077	3	75	0.793	
1004	$C_5H_{10}O$	*n*-Valeric aldehyde C_4H_9CHO	86 077		103 4	$0\ 819^{11}$	70
1005	$C_5H_{10}O$	Diethyl ketone $(C_2H_5)_2CO$	86 077	−42.0	101 7	0 814	86
1006	$C_5H_{10}O$	Methyl propyl ketone $CH_3COC_3H_7$	86 077	−77.8	101.7	$0\ 812_{10}^{15}$	75
1007	$C_5H_{10}O$	Methyl isopropyl ketone	86 077	−92.0	93	$0\ 815^{15}$	62
1008	$C_5H_{10}O$	Pentamethylene oxide	86 077		87	$0\ 880^0$	
1009	$C_5H_{10}O_2$	3-Acetylpropyl alcohol	102 08		209	$1\ 016^0$	
1010	$C_5H_{10}O_2$	*dl*-Methylethylacetic acid	102 08	< −80	174	0 941	153
1011	$C_5H_{10}O_2$	Trimethylacetic acid $(CH_3)_3CCO_2H$	102 08	35 5	163 8	$0\ 905^{50}$	1050
1012	$C_5H_{10}O_2$	*n*-Valeric acid $C_5H_{11}CO_2H$	102 08	−59; −31 5	187 0	0 942	175
1013	$C_5H_{10}O_2$	Isovaleric acid $(CH_3)_2CHCH_2CO_2H$	102 08	−37 6	176 7	$0\ 937_4^{15}$	145
1014	$C_5H_{10}O_2$	*n*-Butyl formate $HCO_2C_4H_9$	102 08	−90 0	106 8	$0\ 911^0$	74
1015	$C_5H_{10}O_2$	*d-sec*-Butyl formate	102 08		97	0 882	48
1016	$C_5H_{10}O_2$	Isobutyl formate $(CH_3)_2CHCH_2CO_2H$	102 08	−95 3	98 2	0 875	58
1017	$C_5H_{10}O_2$	Ethyl propionate $C_2H_5CO_2C_2H_5$	102 08	−72 6	99 1	0 891	51
1018	$C_5H_{10}O_2$	Methyl *n*-butyrate $C_3H_7CO_2CH_3$	102 08	< −95	102 3	0.898	68
1019	$C_5H_{10}O_2$	Methyl isobutyrate $(CH_3)_2CHCO_2CH_3$	102 08	−84 7	92 6	0 891	49
1020	$C_5H_{10}O_2$	*n*-Propyl acetate $CH_3CO_2C_3H_7$	102 08	−92 5	101.6	0 887	52
1021	$C_5H_{10}O_2$	Isopropyl acetate $CH_3COCH_2(CH_3)_2$	102 08	−73.4	89	$0\ 877^{15\ 6}$	
1022	$C_5H_{10}O_2S$	Ethyl thiocarbonate $CS(OC_2H_5)_2$	134.14		162	1 028	939
1023	$C_5H_{10}O_3$	1-Hydroxyvaleric acid	118 08	31			
1024	$C_5H_{10}O_3$	1-Hydroxyisovaleric acid	118 08	86			
1025	$C_5H_{10}O_3$	2-Hydroxyvaleric acid	118.08	< −32			
1026	$C_5H_{10}O_3$	Diethyl carbonate $(C_2H_5O)_2CO$	118.08	−43.0	125.8	0 979	57
1027	$C_5H_{10}O_3$	Ethyl hydracrylate	118.08		84^{12}	1.064_4^{25}	2
1028	$C_5H_{10}O_3$	Ethyl lactate $CH_3CH(OH)CO_2C_2H_5$	118.08		154	1 031	
1028.1	$C_5H_{10}O_3$	Methyl *l*-1-methoxypropionate	118.08		131	$0.9986^{18\ 4}$	892
1029	$C_5H_{10}O_3$	Propyl glycollate $HOCH_2CO_2C_3H_7$	118.08		170.5	1.062^{18}	
1030	$C_5H_{10}O_4$	Ethyl glycerate	134.08		121^{14}	1.191_{15}^{15}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1031	$C_5H_{10}O_4$	Glycerol acetate (Monoacetin)	134.08		158^{165}	1.20	
1032	$C_5H_{10}O_5$	*d*(*l*)-α-Arabinose	150.08	159.5		1.585	1243
1033	$C_5H_{10}O_5$	*d*(*l*)-β-Arabinose	150.08			1.605	1248
1034	$C_5H_{10}O_5$	*dl*-Arabinose	150.08	164.5			
1035	$C_5H_{10}O_5$	*d*-Lyxose	150.08	105		1.545	1228
1036	$C_5H_{10}O_5$	*d*-Ribose	150.08	87			
1037	$C_5H_{10}O_5$	*l*-Xylose	150.08	153		1.525	1231
1038	$C_5H_{10}O_5$	*dl*-Xylose	150.08	131			
1039	$C_5H_{10}O_6$	Arabonic acid $HO_2C(CHOH)_3CH_2OH$	166.08	89			
1040	$C_5H_{11}Br$	*n*-Amyl bromide $CH_3(CH_2)_4Br$	151.00		127.9	1.223	401
1041	$C_5H_{11}Br$	Isoamyl bromide $(CH_3)_2CHCH_2CH_2Br$	151.00		121	1.215	378
1042	$C_5H_{11}Br$	*tert*.-Amyl bromide $(CH_3)_2(C_2H_5)CBr$	151.00		109.2	1.190	389
1043	$C_5H_{11}Cl$	*n*-Amyl chloride $CH_3(CH_2)_4Cl$	106.54		105.7	0.883	191
1044	$C_5H_{11}Cl$	Isoamyl chloride $(CH_3)_2CHCH_2CH_2Cl$	106.54		99.1	0.893	181
1045	$C_5H_{11}Cl$	*tert*.-Amyl chloride $(CH_3)_2(C_2H_5)CCl$	106.54	−72.9	85.7	0.870^{15}	155
1046	$C_5H_{11}Cl$	*sec*.-Amyl chloride $C_3H_7(CH_3)CHCl$	106.54		105	0.870	157
1047	$C_5H_{11}Cl$	3-Chloropentane $(C_2H_5)_2CHCl$	106.54		105	0.895	
1048	$C_5H_{11}ClO$	*tert*.-Amyl hypochlorite	122.54		76.3	0.855	
1049	$C_5H_{11}F$	*n*-Amyl fluoride $CH_3(CH_2)_4F$.	90.085	> -80	62.8	0.788	11
1050	$C_5H_{11}F$	Isoamyl fluoride $(CH_3)_2CHCH_2CH_2F$	90.085	< -11	53.5		
1051	$C_5H_{11}I$	*n*-Amyl iodide $CH_3(CH_2)_4I$	198.02		156	1.517	572
1052	$C_5H_{11}I$	Isoamyl iodide $(CH_3)_2CHCH_2CH_2I$	198.02		148	1.510	
1053	$C_5H_{11}I$	*tert*.-Amyl iodide $(CH_3)_2(C_2H_5)CHI$	198.02		125	1.497^{19}	
1054	$C_5H_{11}N$	Piperidine	85.093	−9	105.8	0.860	444
1055	$C_5H_{11}NO$	Diethylketoxime $(C_2H_5)_2C{:}NOH$	101.09		168.3	0.914	407
1056	$C_5H_{11}NO$	Methylpropylketoxime	101.09		168	0.909	403
1057	$C_5H_{11}NO$	Valeramide $C_4H_9CONH_2$	101.09	106		1.023	
1058	$C_5H_{11}NO$	Isovaleramide $(CH_3)_2CHCH_2CONH_2$.	101.09	137	232	0.965	
1059	$C_5H_{11}NO_2$	1-Aminovaleric acid	117.09	291.5			
1060	$C_5H_{11}NO_2$	3-Aminovaleric acid	117.09	193			
1061	$C_5H_{11}NO_2$	4-Aminovaleric acid	117.09	157			
1062	$C_5H_{11}NO_2$	2-Aminoisovaleric acid	117.09	217			
1063	$C_5H_{11}NO_2$	*n*-Amyl nitrite $CH_3(CH_2)_4ONO$	117.09		104^{76}	0.853	56
1064	$C_5H_{11}NO_2$	Isoamyl nitrite $(CH_3)_2CH(CH_2)_2ONO$	117.09		99	0.872	67
1065	$C_5H_{11}NO_2$	*tert*.-Amyl nitrite $(CH_3)_2(C_2H_5)CONO$	117.09		93	0.903^0	
1066	$C_5H_{11}NO_2$	*n*-Butyl carbamate $C_4H_9CO_2NH_2$	117.09	54			
1067	$C_5H_{11}NO_2$	Isobutyl carbamate $H_2NCO_2C_4H_9$	117.09	67	206		
1067.1	$C_5H_{11}NO_2$	Ethylurethane $C_2H_5NHCO_2C_2H_5$	117.09		176	0.981	262
1068	$C_5H_{11}NO_2$	Betaine	117.09	273 d			
1069	$C_5H_{11}NO_2$	*dl*-Valine $(CH_3)_2CHCH(NH_2)CO_2H$	117.09	298 d.			
1069.1	$C_5H_{11}NO_2$	*d*-Valine	117.09	315			1327
1070	$C_5H_{11}NO_3$	Isoamyl nitrate	133.09		148	$0.996^{21.7}$	200
1070.1	$C_5H_{11}NO_3$	Bios	133.09	223			1163
1070.2	$C_5H_{11}NO_4$	Methyltetronic amide	149.09	135 d.			1218
1071	$C_5H_{11}NO_5$	*l*-Arabinose oxime	165.09	139			
1072	C_5H_{12}	2-Methylbutane (Isopentane)	72.092	−159.7	28.0	$0.621^{19.1}$	9
1073	C_5H_{12}	*n*-Pentane $CH_3(CH_2)_3CH_3$	72.092	−131.5	36.2	0.631	10
1074	C_5H_{12}	2, 2-Dimethypropane $(CH_3)_4C$	72.092	−20	9.5		
1075	$C_5H_{12}ClN$	Piperidine hydrochloride	121.56	237			
1076	$C_5H_{12}ClNO_2$	Betaine hydrochloride	153.56	235			
1077	$C_5H_{12}N_2O$	1, 2-Diethylurea $CO(NHC_2H_5)_2$	116.11	106	263	1.042	
1078	$C_5H_{12}O$	*n*-Amyl alcohol $CH_3(CH_2)_3CH_2OH$	88.092	−78.5	137.9	0.817^{20}_{20}	823
1079	$C_5H_{12}O$	Isoamyl alcohol* $(CH_3)_2CHCH_2CH_2OH$	88.092	−117.2	130.5	0.812	166
1080	$C_5H_{12}O$	Diethyl carbinol $(C_2H_5)_2CHOH$	88.092		115.6	0.815^{24}_4	179
1081	$C_5H_{12}O$	*tert*.-Amyl alcohol $(CH_3)_2(C_2H_5)COH$	88.092	−11.9	101.8	0.809	158
1082	$C_5H_{12}O$	*tert*.-Butyl carbinol	88.092	53	114		
1083	$C_5H_{12}O$	*d*-Amyl alcohol $CH_3(C_2H_5)CHCH_2OH$	88.092		128	0.816	
1084	$C_5H_{12}O$	*sec*.-Amyl alcohol $CH_3(C_3H_7)CH_2OH$	88.092		119.5	0.809	165
1084.1	$C_5H_{12}O$	*d-sec*.-Amyl alcohol	88.092		118	0.8103	154
85	$C_5H_{12}O$	Methyl isopropyl carbinol	88.092		114	0.819	
85.1	$C_5H_{12}O$	*d*-Methyl isopropyl carbinol	88.092			0.818	106
86	$C_5H_{12}O$	Ethyl propyl ether $C_2H_5OC_3H_7$.	88.092	< -79	61.4	0.732	24
7	$C_5H_{12}O$	Ethyl isopropyl ether $C_2H_5OCH(CH_3)_2$.	88.092		54	0.745^0	

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* Commercially known as "Amyl alcohol."

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
1088	$C_5H_{12}O$	Methyl *n*-butyl ether $CH_3OC_4H_9$	88.092		70.3	0.764^0	
1089	$C_5H_{12}O_2$	Pentane-1, 2-diol $C_3H_7CHOHCH_2OH$	104.09		211.8	0.980^{20}_{20}	376
1090	$C_5H_{12}O_2$	Pentane-1, 5-diol $CH_2(CH_2CH_2OH)_2$	104.09		239.4	0.994^{20}_{20}	432
1091	$C_5H_{12}O_2$	Methylene diethyl ether $CH_2(OC_2H_5)_2$	104.09		89	0.851^0	
1092	$C_5H_{12}O_3$	Glycerol 1-ethyl ether	120.09		230	1.091	
1093	$C_5H_{12}O_4$	Pentaerythritol	136.09	253			1178
1094	$C_5H_{12}O_5$	Adonitol	152.09	102			1333
1095	$C_5H_{12}O_5$	*d*-Arabitol	152.09	103			
1096	$C_5H_{12}S$	*n*-Amyl mercaptan $C_5H_{11}SH$	104.16		126	0.857^{20}	396
1097	$C_5H_{12}S$	*act*-Amyl mercaptan	104.16		118	0.848^{13}	
1098	$C_5H_{12}S$	Isoamyl mercaptan	104.16		129.5	0.835	379
1099	$C_5H_{13}N$	*n*-Amylamine $C_5H_{11}NH_2$	87.108	−55.0	104	0.766^{19}	
1100	$C_5H_{13}N$	Isoamylamine $(CH_3)_2CHCH_2CH_2NH_2$.	87.108		95	0.751	176
1101	$C_5H_{13}N$	*sec.*-Amylamine $CH_3(C_3H_7)CH_2NH_2$	87.108		91	0.749	
1102	$C_5H_{13}N$	*tert*-Amylamine $(CH_3)_2(C_2H_5)CNH_2$.	87.108	−105.0	78		
1103	$C_5H_{13}NO_2$	Ammonium valerate	119.11				1333
1105	$C_5H_{14}N_2$	Pentamethylenediamine	102.12	9	178	0.885^{15}_{15}	482
1106	$C_6Br_4O_2$	Bromanil $OC:(CBrCBr)_2\ CO$	423.66	300			
1107	C_6Br_6	Hexabromobenzene	551.50	306			
1108	C_6Br_6O	"Hexabromophenol".	367.50	128			
1109	$C_6Cl_4O_2$	Chloranil $OC.(CClCCl)_2:CO$	245.83	290			
1110	C_6Cl_6	Hexachlorobenzene	284.75	226	326 •	1.569^{236}	
1111	C_6Cl_6O	"Hexachlorophenol"	300.75	46			
1111.1	C_6Cl_8O	β-Octachlorocyclohexenone	371.67	90		2.016	1292
1111.2	C_6Cl_8O	γ-Octachlorocyclohexenone	371.67	89		2.058	1305
1112	C_6I_6	Hexaiodobenzene	833.59	350 d.			
1113	C_6HBr_5	Pentabromobenzene	472.59	293			
1114	C_6HBr_5O	Pentabromophenol $C(Br_5)OH$	488.59	225			
1115	$C_6HCl_3O_2$	Trichloroquinone	211.38	168			
1116	$C_6HCl_4NO_2$	2, 3, 4, 5-Tetrachloronitrobenzene	260.85	64.5			
1117	$C_6HCl_4NO_2$	2, 3, 4, 6-Tetrachloronitrobenzene	260.85	22			
1118	$C_6HCl_4NO_2$	2, 3, 5, 6-Tetrachloronitrobenzene	260.85	99	304 d.		
1119	C_6HCl_5	Pentachlorobenzene	250.30	86	277	1.842^{10}	
1120	C_6HCl_5O	Pentachlorophenol HOC_6Cl_5	266.30	188	310.2	1.978	
1121	$C_6HN_5O_{11}$	Pentanitrophenol $C_6(NO_2)_5OH$	319.05	190 d.			
1122	$C_6H_2BrN_3O_6$	Picryl bromide 2, 4, $6(NO_2)_3C_6H_2Br$.	291.96	123			
1122.1	$C_6H_2Br_2N_2O_4$	1, 2-Dinitro-4, 5-dibromobenzene	325.86	115		2.313	
1122.2	$C_6H_2Br_2N_2O_4$	1, 3-Dinitro-4, 6-dibromobenzene	325.86	117		2.295	
1123	$C_6H_2Br_4$	1, 2, 3, 5-Tetrabromobenzene .	393.68	98.5	329		
1124	$C_6H_2Br_4$	1, 2, 4, 5-Tetrabromobenzene	393.68	178		3.027	
1125	$C_6H_2Br_4O$	2, 3, 4, 6-Tetrabromophenol	409.68	120			
1126	$C_6H_2Br_5N$	Pentabromoaniline $C_6(Br_5)NH_2$	487.60	222			
1127	$C_6H_2ClN_3O_6$	Picryl chloride $(NO_2)_3C_6H_2Cl$	247.50	83		1.797	
1128	$C_6H_2ClN_3O_6$	5-Chloro-1, 2, 4-trinitrobenzene	247.50	116			
1129	$C_6H_2Cl_2O_2$	2, 5-Dichloroquinone	176.93	161			
1130	$C_6H_2Cl_2O_2$	2, 6-Dichloroquinone .	176.93	121			
1131	$C_6H_2Cl_3NO_2$	2, 3, 4-Trichloronitrobenzene	226.40	56			
1132	$C_6H_2Cl_3NO_2$	2, 3, 6-Trichloronitrobenzene	226.40	89			
1133	$C_6H_2Cl_3NO_2$	2, 4, 5-Trichloronitrobenzene	226.40	57	288	1.790	
1134	$C_6H_2Cl_3NO_2$	2, 4, 6-Trichloronitrobenzene	226.40	68			
1135	$C_6H_2Cl_4$	1, 2, 3, 4-Tetrachlorobenzene	215.85	47.5	254		
1136	$C_6H_2Cl_4$	1, 2, 3, 5-Tetrachlorobenzene	215.85	51	246		
1137	$C_6H_2Cl_4$	1, 2, 4, 5-Tetrachlorobenzene	215.85	138	246	1.734^{10}	
1138	$C_6H_2Cl_4O$	2, 3, 4, 6-Tetrachlorophenol	231.85	69	164^{23}		
1139	$C_6H_2Cl_4O_2$	Tetrachlorohydroquinone	247.85	232			
1140	$C_6H_2Cl_5N$	Pentachloroaniline $C_6(Cl_5)NH_2$	265.31	232			
1141	$C_6H_2IN_3O_6$	Picryl iodide $(NO_2)_3C_6H_2I$	338.97	165		$2.285^{22.5}$	
1142	$C_6H_2I_2N_2O_4$	2, 4-Diiodo-1, 3-dinitrobenzene	419.90	162			1315
1143	$C_6H_2I_2N_2O_4$	4, 6-Diiodo-1, 3-dinitrobenzene	419.90	168.4		2.744	
1144	$C_6H_2I_4$	1, 2, 3, 4-Tetraiodobenzene	581.74	136			
1145	$C_6H_2I_4$	1, 2, 3, 5-Tetraiodobenzene.. .	581.74	148			
1146	$C_6H_2I_4$	1, 2, 4, 5-Tetraiodobenzene . ..	581.74	254			
1147	$C_6H_2N_4O_9$	2, 3, 4, 6-Tetranitrophenol..	274.05	140	d.		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1148	$C_6H_2O_4$	Diacetylenedicarboxylic acid	138.02	178 exp.			
1149	$C_6H_3BrN_2O_4$	3-Bromo-1, 2-dinitrobenzene	246.96	101.5	320		1302
1150	$C_6H_3BrN_2O_4$	4-Bromo-1, 2-dinitrobenzene	246.96	59.4			
1151	$C_6H_3BrN_2O_4$	4-Bromo-1, 3-dinitrobenzene	246.96	75.3			
1152	$C_6H_3Br_2NO_2$	2, 4-Dibromonitrobenzene	280.86	62		2.356	
1153	$C_6H_3Br_2NO_2$	2, 5-Dibromonitrobenzene	280.86	85		2.368	
1154	$C_6H_3Br_2NO_2$	3, 4-Dibromonitrobenzene	280.86	58	296	2.354	
1155	$C_6H_3Br_2NO_2$	3, 5-Dibromonitrobenzene	280.86	106			
1155.1	$C_6H_3Br_2NO_3$	4, 6-Dibromo-2-nitrophenol	296.86	117.5		2.434	
1156	$C_6H_3Br_3$	1, 2, 3-Tribromobenzene	314.77	87.4		2.658	
1157	$C_6H_3Br_3$	1, 2, 4-Tribromobenzene	314.77	44	276		
1158	$C_6H_3Br_3$	1, 3, 5-Tribromobenzene.........	314.77	119.6	278		
1159	$C_6H_3Br_3O$	2, 3, 5-Tribromophenol $Br_3C_6H_2OH$	330.77	92.5			
1160	$C_6H_3Br_3O$	2, 4, 6-Tribromophenol $Br_3C_6H_2OH$	330.77	96		2.55	
1161	$C_6H_3Br_3O_2$	2, 4, 6-Tribromoresorcinol .	346.77	111			
1162	$C_6H_3ClN_2O_4$	3-Chloro-1, 2-dinitrobenzene	202.50	86.8			
1163	$C_6H_3ClN_2O_4$	4-Chloro-1, 2-dinitrobenzene	202.50	α 36.3 β 37.1 γ 38.8 δ 28	315 d		
1164	$C_6H_3ClN_2O_4$	2-Chloro-1, 3-dinitrobenzene ..	202.50	87			
1165	$C_6H_3ClN_2O_4$	α-4-Chloro-1, 3-dinitrobenzene....	202.50	53.4	315	1.697	
1166	$C_6H_3ClN_2O_4$	β-4-Chloro-1, 3-dinitrobenzene.	202.50	43	315	1.680	
1167	$C_6H_3ClN_2O_4$	5-Chloro-1, 3-dinitrobenzene. .	202.50	59			
1168	$C_6H_3ClN_2O_4$	2-Chloro-1, 4-dinitrobenzene	202.50	60			
1169	$C_6H_3Cl_2NO_2$	2, 3-Dichloronitrobenzene.	191.95	62	258	1.721^{14}	
1170	$C_6H_3Cl_2NO_2$	2, 4-Dichloronitrobenzene..	191.95	33		1.439^{80}	
1171	$C_6H_3Cl_2NO_2$	2, 5-Dichloronitrobenzene ..	191.95	54.5	266	1.669^{22}	
1172	$C_6H_3Cl_2NO_2$	2, 6-Dichloronitrobenzene.	191.95	72.5	130^{8}	1.603^{17}	
1173	$C_6H_3Cl_2NO_2$	3, 4-Dichloronitrobenzene..	191.95	43	256	1.451^{80}	
1174	$C_6H_3Cl_2NO_2$	3, 5-Dichloronitrobenzene .	191.95	65.4		1.692^{14}	
1174.1	$C_6H_3Cl_2NO_3$	4, 6-Dichloro-2-nitrophenol..	207.95	122		1.822	
1175	$C_6H_3Cl_3$	1, 2, 3-Trichlorobenzene.	181.40	52	219		
1176	$C_6H_3Cl_3$	1, 2, 4-Trichlorobenzene	181.40	17	213	1.574^{10}	754
1177	$C_6H_3Cl_3$	1, 3, 5-Trichlorobenzene	181.40	63	208.5		
1178	$C_6H_3Cl_3O$	2, 3, 5-Trichlorophenol	197.40	53.4	253		
1179	$C_6H_3Cl_3O$	2, 4, 6-Trichlorophenol ..	197.40	68	244.5		
1180	$C_6H_3Cl_3O_2$	2, 3, 5-Trichlorohydroquinone	213.40	134			
1181	$C_6H_3Cl_3O_2$	2, 4, 6-Trichlororesorcinol...	213.40	83			
1182	$C_6H_3Cl_3O_6S_3$	Benzene-1, 3, 5-trisulfonyl chloride	373.59	184			
1183	$C_6H_3Cl_4N$	2, 3, 4, 5-Tetrachloroaniline	230.86	118			
1184	$C_6H_3Cl_4N$	2, 3, 4, 6-Tetrachloroaniline	230.86	88			
1185	$C_6H_3Cl_4N$	2, 3, 5, 6-Tetrachloroaniline...	230.86	90			
1186	$C_6H_3I_3$	1, 2, 3-Triiodobenzene.	455.82	116			
1187	$C_6H_3I_3$	1, 2, 4-Triiodobenzene	455.82	84			
1188	$C_6H_3I_3$	1, 3, 5-Triiodobenzene	455.82	181			
1189	$C_6H_3I_3O$	2, 4, 6-Triiodophenol $I_3C_6H_2(OH)$	471.82	156			
1190	$C_6H_3N_3O_6$	1, 2, 3-Trinitrobenzene	213.05	127.5			
1191	$C_6H_3N_3O_6$	1, 2, 4-Trinitrobenzene	213.05	61		$1.73^{15.5}$	
1192	$C_6H_3N_3O_6$	1, 3, 5-Trinitrobenzene ...	213.05	121; 61	d.	1.688	
1193	$C_6H_3N_3O_6S$	Thiopicric acid	245.11	114	exp. 115		
1194	$C_6H_3N_3O_7$	2, 3, 5-Trinitrophenol $C_6H_2(NO_2)_3OH$.	229.05	120			
1195	$C_6H_3N_3O_7$	2, 3, 6-Trinitrophenol $C_6H_2(NO_2)_3OH$.	229.05	118			
1196	$C_6H_3N_3O_7$	2, 4, 5-Trinitrophenol $C_6H_2(NO_2)_3OH$..	229.05	96			
1197	$C_6H_3N_3O_7$	Picric acid $(NO_2)_3C_6H_2OH$	229.05	121.8	exp. > 300	1.763	1313
1198	$C_6H_3N_3O_8$	Styphnic acid.....	245.05	180		1.829	
1199	$C_6H_3N_3O_9S$	Picrylsulfonic acid... ...	293.11	100			
1200	$C_6H_3N_5O_8$	2, 3, 4, 6-Tetranitroaniline . .	273.06	170	exp. 237	1.89	1314
1200.1	C_6H_4BrCl	*o*-Bromochlorobenzene..........	191.40	−12.6	204^{765}	$1.656^{12.5}$	765
1200.2	C_6H_4BrCl	*m*-Bromochlorobenzene........ ..	191.40	−21.2	196	1.627^{14}	764
1200.3	C_6H_4BrCl	*p*-Bromochlorobenzene......... .	191.40	67.4	196.3		
1200.4	C_6H_4BrI	*o*-Bromoiodobenzene.	282.88	2.1	257.4^{764}		
1200.5	C_6H_4BrI	*m*-Bromoiodobenzene.................	282.88	−9.3	252^{764}		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1200.6	C_6H_4BrI	*p*-Bromoiodobenzene	282.88	92	251.6^{764}		
1201	$C_6H_4BrNO_2$	*o*-Bromonitrobenzene	201.96	43.0	261	1.623_4^{20}	
1202	$C_6H_4BrNO_2$	*m*-Bromonitrobenzene	201.96	56.0	256.5	1.704	777
1203	$C_6H_4BrNO_2$	*p*-Bromonitrobenzene	201.96	127	256		
1204	$C_6H_4Br_2$	*o*-Dibromobenzene	235.86	1.8	221	1.966_4^{15}	787
1205	$C_6H_4Br_2$	*m*-Dibromobenzene	235.86	−6.9	217	1.955	783
1206	$C_6H_4Br_2$	*p*-Dibromobenzene	235.86	86.8	219	1.954	1132
1207	$C_6H_4Br_2O$	2, 4-Dibromophenol	251.86	36	239		
1208	$C_6H_4Br_2O$	2, 6-Dibromophenol	251.86	56			
1209	$C_6H_4Br_2O$	3, 4-Dibromophenol	251.86	80			
1210	$C_6H_4Br_2O$	3, 5-Dibromophenol	251.83	76.5			
1211	$C_6H_4Br_2O_2$	2, 4-Dibromoresorcinol	267.86	92.5			
1212	$C_6H_4Br_2O_2$	4, 6-Dibromoresorcinol	267.86	112	130 (in CO_2)		
1213	$C_6H_4Br_3N$	2, 4, 6-Tribromoaniline	329.79	119	300		
1214	$C_6H_4Br_3N$	3, 4, 5-Tribromoaniline	329.79	118			
1214.1	C_6H_4ClI	*p*-Chloroiodobenzene	238.42	57	227.6^{741}		
1215	$C_6H_4ClNO_2$	*o*-Chloronitrobenzene	157.50	32.5	245.7	1.365	
1216	$C_6H_4ClNO_2$	*m*-Chloronitrobenzene	157.50	44.4; 23.7	235.6	1.534	
1217	$C_6H_4ClNO_2$	*p*-Chloronitrobenzene	157.50	83.5	242	1.520	
1218	$C_6H_4ClNO_3$	4-Chloro-2-nitrophenol	173.50	87			
1219	$C_6H_4ClNO_3$	5-Chloro-2-nitrophenol	173.50	38.9			
1220	$C_6H_4ClNO_3$	6-Chloro-2-nitrophenol	173.50	70			
1221	$C_6H_4ClNO_3$	2-Chloro-3-nitrophenol	173.50	120			
1222	$C_6H_4ClNO_3$	4-Chloro-3-nitrophenol	173.50	127			
1223	$C_6H_4ClNO_3$	5-Chloro-3-nitrophenol	173.50	147			
1224	$C_6H_4ClNO_3$	6-Chloro-3-nitrophenol	173.50	118			
1225	$C_6H_4ClNO_3$	2-Chloro-4-nitrophenol	173.50	111			
1226	$C_6H_4ClNO_3$	3-Chloro-4-nitrophenol	173.50	133			
1227	$C_6H_4ClNO_5S$	2-Chloronitrobenzene-5-sulfonic acid	237.56	>200 d.			
1228	$C_6H_4ClNO_5S$	5-Chloronitrobenzene-3-sulfonic acid	237.56	200 d.			
1229	$C_6H_4Cl_2$	*o*-Dichlorobenzene	146.95	−17.6	179	1.298	731
1230	$C_6H_4Cl_2$	*m*-Dichlorobenzene	146.95	−24.8	173	1.288	723
1231	$C_6H_4Cl_2$	*p*-Dichlorobenzene	146.95	52.9	173	1.458	1101
1232	$C_6H_4Cl_2O$	2, 3-Dichlorophenol	162.95	57			
1233	$C_6H_4Cl_2O$	2, 4-Dichlorophenol	162.95	45	210		
1234	$C_6H_4Cl_2O$	2, 5-Dichlorophenol	162.95	58	211.7		
1235	$C_6H_4Cl_2O$	2, 6-Dichlorophenol	162.95	67	220		
1236	$C_6H_4Cl_2O$	3, 4-Dichlorophenol	162.95	68	253.5		
1237	$C_6H_4Cl_2O$	3, 5-Dichlorophenol	162.95	68	233.1		
1238	$C_6H_4Cl_2O_2$	2, 3-Dichlorohydroquinone	178.95	145			
1239	$C_6H_4Cl_2O_2$	2, 5-Dichlorohydroquinone	178.95	170		1.824	
1240	$C_6H_4Cl_2O_2$	2, 6-Dichlorohydroquinone	178.95	164			
1241	$C_6H_4Cl_2O_4S$	2, 5-Dichlorobenzenesulfonic acid	227.01	97			
1242	$C_6H_4Cl_2O_4S_2$	*o*-Benzenedisulfonyl chloride	275.08	105			
1243	$C_6H_4Cl_2O_4S_2$	*m*-Benzendisulfonyl chloride	275.08	63			
1244	$C_6H_4Cl_2O_4S_2$	*p*-Benzenedisulfonyl chloride	275.08	131			
1245	$C_6H_4Cl_3N$	2, 3, 4-Trichloroaniline	196.41	67.5	291.5		
1246	$C_6H_4Cl_3N$	2, 4, 5-Trichloroaniline	196.41	96	270		
1247	$C_6H_4Cl_3N$	2, 4, 6-Trichloroaniline	196.41	77.5	262.4		
1248	$C_6H_4Cl_3N$	3, 4, 5-Trichloroaniline $Cl_3C_6H_2NH_2$.	196.41	100			
1249	$C_6H_4FNO_2$	*o*-Fluoronitrobenzene	141.04	−5.9	214.6	1.338	700
1250	$C_6H_4FNO_2$	*m*-Fluoronitrobenzene	141.04	1.7	205	1.327	688
1251	$C_6H_4FNO_2$	*p*-Fluoronitrobenzene	141.04	26.5; 21.5	205	1.326	1084
1252	$C_6H_4F_2$	*m*-Difluorobenzene	114.03		83	1.172	384
1253	$C_6H_4F_2$	*p*-Difluorobenzene	114.03	−23.7	88.9	1.164	362
1254	$C_6H_4INO_2$	*o*-Iodonitrobenzene	248.97	49.4	290	$1.810_4^{15.5}$	
1255	$C_6H_4INO_2$	*m*-Iodonitrobenzene	248.97	36	280	$1.804_4^{15.5}$	
1256	$C_6H_4INO_2$	*p*-Iodonitrobenzene	248.97	171.5	288.1	$1.809_4^{15.5}$	
1257	$C_6H_4INO_3$	4-Iodo-6-nitrophenol $IC_6H_3(NO_2)OH$.	264.97	81			
1258	$C_6H_4I_2$	*o*-Diiodobenzene	329.90	23.4	286.8		
1259	$C_6H_4I_2$	*m*-Diiodobenzene	329.90	34.2	284.8		
1260	$C_6H_4I_2$	*p*-Diiodobenzene....	329.90	129.4	285		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1261	$C_6H_4I_2O$	2, 4-Diiodophenol	345.90	72	100		
1262	$C_6H_4I_2O$	2, 6-Diiodophenol $I_2C_6H_3OH$	345.90	68			
1263	$C_6H_4I_2O$	3, 4-Diiodophenol $I_2C_6H_3OH$	345.90	83			
1264	$C_6H_4I_2O$	3, 5-Diiodophenol $I_2C_6H_3OH$	345.90	104			
1265	$C_6H_4I_2O_4S$	2, 6-Diiodophenol-4-sulfonic acid	425.96	120	190 d.		
1266	$C_6H_4I_3N$	2, 4, 6-Triiodoaniline $I_3C_6H_2NH_2$	470.81	185.5			
1267	$C_6H_4N_2$	Pyridyl-2-cyanide $CN.C_5H_4N$	104.05	29			
1268	$C_6H_4N_2$	Pyridyl-3-cyanide $CN.C_5H_4N$	104.05	50			
1269	$C_6H_4N_2$	Pyridyl-4-cyanide $CN.C_5H_4N$	104.05	79			
1270	$C_6H_4N_2O$	*p*-Diazophenol	120.05	exp. 38			
1271	$C_6H_4N_2O_4$	*o*-Dinitrobenzene	168.05	116.5	319	1.59	
1272	$C_6H_4N_2O_4$	*m*-Dinitrobenzene	168.05	89.7	302	1.575	
1273	$C_6H_4N_2O_4$	*p*-Dinitrobenzene	168.05	172.1	299	1.625	
1274	$C_6H_4N_2O_5$	2, 3-Dinitrophenol $(NO_2)_2C_6H_3OH$	184.05	144			
1275	$C_6H_4N_2O_5$	2, 4-Dinitrophenol	184.05	111.6		1.683	
1276	$C_6H_4N_2O_5$	2, 5-Dinitrophenol $(NO_2)_2C_6H_3OH$	184.05	104			
1277	$C_6H_4N_2O_5$	2, 6-Dinitrophenol $(NO_2)_2C_6H_3OH$	184.05	61.8			
1278	$C_6H_4N_2O_5$	3, 4-Dinitrophenol $(NO_2)_2C_6H_3OH$	184.05	134			
1279	$C_6H_4N_2O_5$	3, 5-Dinitrophenol	184.05	126.1			
1280	$C_6H_4N_2O_6$	2, 4-Dinitroresorcinol	200.05	148	d.		
1281	$C_6H_4N_2O_6$	4, 6-Dinitroresorcinol	200.05	215			
1282	$C_6H_4N_2O_7S$	2, 4-Dinitrobenzenesulfonic acid	248.11	108			
1283	$C_6H_4N_2S$	Benzisothiodiazole	136.11	44	206		
1284	$C_6H_4N_4O_6$	Picramide 2, 4, 6-$(NO_2)_3C_6H_2NH_2$	228.06	188			
1285	$C_6H_4N_4O_7$	2, 4, 6-Trinitroaminophenol	244.06	178			
1286	$C_6H_4N_6$	Hexaazobenzene	160.08	83			
1287	$C_6H_4O_2$	Quinone	108.03	115.7		1.318	
1288	$C_6H_4O_4$	2, 5-Dihydroxyquinone	140.03	220			
1289	$C_6H_4O_6$	Sarsapic acid	172.03	305			
1290	$C_6H_4O_8$	Ethanetetracarboxylic acid	204.03	169 d.			
1291	$C_6H_5AsCl_2$	Phenyl dichloroarsine	222.92		253		
1292	C_6H_5AsO	Phenylarsine oxide	168.00	120			
1294	C_6H_5Br	Bromobenzene	156.96	−30.6	156.2	1.497	747
1295	$C_6H_5BrN_2O_2$	4-Bromo-2-nitroaniline	216.97	111			
1296	C_6H_5BrO	*o*-Bromophenol	172.96	5.6	195	1.553^{80}	
1297	C_6H_5BrO	*m*-Bromophenol	172.96	33	236.5		
1298	C_6H_5BrO	*p*-Bromophenol	172.96	63.5	238	1.588^{80}	
1299	$C_6H_5BrO_2$	Bromohydroquinone	188.96	115			
1300	$C_6H_5BrO_2$	2(4)-Bromoresorcinol	188.96	91			
1301	$C_6H_5BrO_3S$	*p*-Bromobenzenesulfonic acid	237.02	88			
1302	$C_6H_5Br_2N$	2, 4-Dibromoaniline	250.88	79.5			
1303	$C_6H_5Br_2N$	2, 5-Dibromoaniline	250.88	52			
1304	$C_6H_5Br_2N$	2, 6-Dibromoaniline	250.88	84	264		
1305	$C_6H_5Br_2N$	3, 4-Dibromoaniline	250.88	80.4			
1306	$C_6H_5Br_2N$	3, 5-Dibromoaniline	250.88	56.5			
1307	C_6H_5Cl	Chlorobenzene	112.50	−45.2	132.1	1.107	681
1308	$C_6H_5ClN_2O_2$	2-Chloro-4-nitroaniline	172.51	105			
1309	$C_6H_5ClN_2O_2$	2-Chloro-5-nitroaniline	172.51	118			
1310	$C_6H_5ClN_2O_2$	3-Chloro-4-nitroaniline	172.51	157			
1311	$C_6H_5ClN_2O_2$	3-Chloro-6-nitroaniline	172.51	125			
1312	$C_6H_5ClN_2O_2$	4-Chloro-2-nitroaniline	172.51	115			
1313	$C_6H_5ClN_2O_2$	4-Chloro-3-nitroaniline	172.51	103			
1314	C_6H_5ClO	*o*-Chlorophenol	128.50	α 7; β 0; γ −4.1	173	$1.241^{18.2}_{15}$	1058
1315	C_6H_5ClO	*m*-Chlorophenol	128.50	32.8	214		1059
1316	C_6H_5ClO	*p*-Chlorophenol	128.50	37	217	1.306	1060
1317	$C_6H_5ClO_2$	Chlorohydroquinone	144.50	106	263		
1318	$C_6H_5ClO_2S$	Benzenesulfone chloride	176.56	14.5	247	1.383^{15}	
1319	$C_6H_5ClO_3S$	*p*-Chlorobenzenesulfonic acid	192.56	67	146^{25}		
1320	$C_6H_5Cl_2N$	2, 3-Dichloroaniline	161.96	24	252		
1321	$C_6H_5Cl_2N$	2, 4-Dichloroaniline	161.96	63	245	1.567	
1322	$C_6H_5Cl_2N$	2, 5-Dichloroaniline	161.96	50	251		
1323	$C_6H_5Cl_2N$	2, 6-Dichloroaniline $Cl_2C_6H_3NH_2$	161.96	39			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
1324	$C_6H_5Cl_2N$	3, 4-Dichloroaniline	161.96	71.5	272		
1325	$C_6H_5Cl_2N$	3, 5-Dichloroaniline	161.96	50.5	260		
1326	$C_6H_5Cl_2OP$	Phosphenyl oxychloride	194.98		258	1.375	
1327	$C_6H_5Cl_2P$	Phosphenyl chloride	178.98		224.6	1.319	804
1328	C_6H_5F	Fluorobenzene	96.039	−41.2	86	1.024	487
1329	C_6H_5FO	*o*-Fluorophenol FC_6H_4OH	112.04	16.1			
1330	C_6H_5FO	*m*-Fluorophenol	112.04	13.8	183^{69}	1.222	652
1331	C_6H_5FO	*p*-Fluorophenol	112.04	28.5; 48.2	188	1.189^{56}_{4}	1083
1332	$C_6H_5F_2N$	2, 5-Difluoroaniline	129.05	13.5	85.8^{30}	$1.288^{17.2}$	
1333	C_6H_5I	Iodobenzene	203.97	−31.4	188.6	1.832	792
1334	C_6H_5IO	*o*-Iodophenol	219.97	40.4	187^{160}	1.876^{80}	
1335	C_6H_5IO	*m*-Iodophenol IC_6H_4OH	219.97	40			
1336	C_6H_5IO	*p*-Iodophenol IC_6H_4OH	219.97	94			
1337	C_6H_5IO	Iodosobenzene	219.97	exp. 210			
1338	$C_6H_5IO_2$	Iodoxybenzene	235.97	exp. 238			
1339	$C_6H_5IO_2S$	Benzenesulfone iodide $C_6H_5SO_2I$	268.04	45			
1340	$C_6H_5I_2N$	2, 4-Diiodoaniline $I_2C_6H_3NH_2$	344.91	96			
1341	C_6H_5NO	Pyridyl-α-aldehyde	107.05		181	1.126	947
1342	C_6H_5NO	Pyridyl-β-aldehyde	107.05		97^{15}		
1343	C_6H_5NO	Nitrosobenzene.	107.05	68	59^{18}		
1344	$C_6H_5NO_2$	Picolinic acid	123.05	137			
1345	$C_6H_5NO_2$	Nicotinic acid	123.05	232			
1346	$C_6H_5NO_2$	Isonicotinic acid	123.05	317			
1347	$C_6H_5NO_2$	Nitrobenzene	123.05	5.7	210.9	1.207	736
1348	$C_6H_5NO_2$	*p*-Nitrosophenol ONC_6H_4OH	123.05	126			
1349	$C_6H_5NO_3$	*o*-Nitrophenol	139.05	45	214.5	1.447	
1350	$C_6H_5NO_3$	*m*-Nitrophenol	139.05	96	194^{70}	1.485	
1351	$C_6H_5NO_3$	*p*-Nitrophenol	139.05	113		1.468	
1352	$C_6H_5NO_4$	2-Nitroresorcinol *m*-$(OH)_2C_6H_3NO_2$	155.05	85			
1353	$C_6H_5NO_4$	4-Nitroresorcinol *m*-$(OH)_2C_6H_3NO_2$	155.05	115			
1354	$C_6H_5NO_4$	Nitrohydroquinone	155.05	134			
1355	$C_6H_5NO_6S$	2-Nitrophenol-4-sulfonic acid	219.11	141			
1356	$C_6H_5N_2$	Aziminobenzene	119.06	99			
1357	$C_6H_5N_3$	Triazobenzene	119.06		73.5^{24}	1.098^{10}	991
1358	$C_6H_5N_3O_4$	2, 3-Dinitroaniline $(NO_2)_2C_6H_3NH_2$	183.06	127			
1359	$C_6H_5N_3O_4$	2, 4-Dinitroaniline..	183.06	188			
1360	$C_6H_5N_3O_4$	2, 5-Dinitroaniline $(NO_2)_2C_6H_3NH_2$	183.06	137			
1361	$C_6H_5N_3O_4$	2, 6-Dinitroaniline	183.06	138			
1362	$C_6H_5N_3O_4$	3, 4-Dinitroaniline $(NO_2)_2C_6H_3NH_2$	183.06	154			
1363	$C_6H_5N_3O_4$	3, 5-Dinitroaniline $(NO_2)_2C_6H_3NH_2$	183.06	159			
1364	$C_6H_5N_3O_5$	Picramic acid	199.06	165			1320
1365	C_6H_6	Benzene	78.046	5.5	79.6	0.878	606
1366	C_6H_6	Dipropargyl	78.046	−6	85.4	0.805	380
1367	$C_6H_6AsCl_3$	Tri- (2-chlorovinyl)arsine	259.38		260	1.572	
1368	C_6H_6BrN	*o*-Bromoaniline	171.97	31.5	251		
1369	C_6H_6BrN	*m*-Bromoaniline	171.97	18.5	251	$1.587^{16.3}_{15}$	793
1370	C_6H_6BrN	*p*-Bromoaniline $BrC_6H_4NH_2$	171.97	66.4			
1371	$C_6H_6Br_2N_2$	3, 4-Dibromophenylhydrazine	265.89	75			
1372	$C_6H_6Br_2N_2$	3, 5-Dibromophenylhydrazine	265.89	95.5			
1373	$C_6H_6Br_6$	α-*trans*-Benzenehexabromide	557.54	212			
1374	$C_6H_6Br_6$	β-*cis*-Benzenehexabromide	557.54	253			
1375	C_6H_6ClN	*o*-Chloroaniline $ClC_6H_4NH_2$	127.51	0	210.5	1.213	774
1376	C_6H_6ClN	*m*-Chloroaniline	127.51	−10.4	229.8	1.215	776
1377	C_6H_6ClN	*p*-Chloroaniline	127.51	71	231	1.170^{70}_{4}	
1378	C_6H_6ClNO	2-Chloro-3-aminophenol	143.51	87			
1379	C_6H_6ClNO	2-Chloro-4-aminophenol	143.51	153			
1380	$C_6H_6ClNO_3S$	*p*-Chlorometanilic acid	207.58	280 d.			
1381	$C_6H_6Cl_2N_2$	2, 4-Dichlorophenylhydrazine	176.98	94			
1382	$C_6H_6Cl_2N_2$	2, 5-Dichlorophenylhydrazine	176.98	105			
1383	$C_6H_6Cl_2N_2$	3, 5-Dichlorophenylhydrazine	176.98	118			
1384	$C_6H_6Cl_6$	α-*trans*-Benzenehexachloride	290.79	157	288	1.87	
1385	$C_6H_6Cl_6$	β-*cis*-Benzenehexachloride	290.79	310		1.89^{19}	

No.	Formula	Name	Mol wt	M. P	B. P.	d	R. I. No.
1386	$C_6H_6Cl_6$	γ-Benzenehexachloride	290.79	112			
1387	$C_6H_6Cl_6$	δ-Benzenehexachloride	290.79	129			
1388	C_6H_6FN	*o*-Fluoroaniline	111.05	−34.6	68.5^{14}	1.151	**716**
1389	C_6H_6FN	*m*-Fluoroaniline	111.05		186.3	1.160	**722**
1390	C_6H_6FN	*p*-Fluoroaniline	111.05	−1.9	189	1.152	**707**
1391	C_6H_6IN	*o*-Iodoaniline	218.99	56.5			
1392	C_6H_6IN	*m*-Iodoaniline	218.99	27			
1393	C_6H_6IN	*p*-Iodoaniline	218.99	62			
1394	$C_6H_6N_2O$	*p*-Nitrosoaniline	122.06	174			
1395	$C_6H_6N_2O_2$	Phenylnitroamine	138.06	46			
1396	$C_6H_6N_2O_2$	*o*-Nitroaniline.	138.06	71.5			
1397	$C_6H_6N_2O_2$	*m*-Nitroaniline $O_2NC_6H_4NH_2$	138.06	111.8	286	1.430	
1398	$C_6H_6N_2O_2$	*p*-Nitroaniline	138.06	148		1.424	
1399	$C_6H_6N_2O_2$	Quinonedioxime *p*-$C_6H_4(NOH)_2$	138.06	240			
1400	$C_6H_6N_2O_3$	3-Nitro-2-aminophenol	154.06	136			
1401	$C_6H_6N_2O_3$	4-Nitro-2-aminophenol	154.06	143			
1402	$C_6H_6N_2O_3$	5-Nitro-2-aminophenol	154.06	202			
1403	$C_6H_6N_2O_3$	6-Nitro-2-aminophenol	154.06	111			
1404	$C_6H_6N_2O_3$	5-Nitro-3-aminophenol	154.06	165			
1405	$C_6H_6N_2O_3$	2-Nitro-4-aminophenol	154.06	206			
1406	$C_6H_6N_2O_3$	3-Nitro-4-aminophenol	154.06	148			
1407	$C_6H_6N_2O_4$	5-Acetylbarbituric acid	170.06	300			
1408	$C_6H_6N_2O_4$	Dimethylalloxan	170.06	255 d.			
1409	$C_6H_6N_4O_3$	1-Methyluric acid	182.08	400 d.			
1410	$C_6H_6N_4O_3$	3-Methyluric acid	182.08	>300 d.			
1411	$C_6H_6N_4O_3$	7-Methyluric acid	182.08	370 d.			
1412	$C_6H_6N_4O_7$	Ammonium picrate .	246.08	d.		1.719	**1318**
1413	C_6H_6O	Phenol	94.046	41	182	1.071_4^{25}	**1064**
1414	$C_6H_6O_2$	*o*-Dihydroxybenzene 1, 2-$C_6H_4(OH)_2$*	110.05	105	245	1.344	**1272**
1415	$C_6H_6O_2$	Resorcinol 1, 3-$C_6H_4(OH)_2$	110.05	110	276.5	1.285^{15}	**1275**
1416	$C_6H_6O_2$	Hydroquinol 1, 4-$C_6H_4(OH)_2$.	110.05	170.5	286.2	1.332^{15}	**1184**
1417	$C_6H_6O_2$	5-Methylfurfural .	110.05		187	1.109^{18}	
1418	$C_6H_6O_2S$	Benzenesulfinic acid	142.11	84	100 d.		
1419	$C_6H_6O_3$	Pyrogallol 1, 2, 3-$C_6H_3(OH)_3$	126.05	134	309	1.453	**1333**
1420	$C_6H_6O_3$	Hydroxyhydroquinone. . . .	126.05	140.5			
1421	$C_6H_6O_3$	Phloroglucinol	126.05	219			
1422	$C_6H_6O_3$	Acrylic anhydride	126.05		97^{36}	1.094^{0}	
1423	$C_6H_6O_3S$	Benzenesulfonic acid . .	158.11	46	d		
1424	$C_6H_6O_4$	Apionol 1, 2, 3, 4-$C_6H_2(OH)_4$.	142.05	161			
1425	$C_6H_6O_4$	1, 2, 3, 5-Tetrahydroxybenzene	142.05	165			
1426	$C_6H_6O_4$	1, 2, 4, 5-Tetrahydroxybenzene	142.05	220			
1427	$C_6H_6O_4$	Muconic acid $(CH.CHCO_2H)_2$	142.05	320 d.			
1428	$C_6H_6O_4S$	*o*-Phenolsulfonic acid.	174.11	50			
1429	$C_6H_6O_6$	Aconitic acid.	174.05	191			
1430	C_6H_6S	Thiophenol C_6H_5SH .	110.11		169.5	1.074	**1002**
1431	C_6H_6Se	Selenophenol C_6H_5SeH.	157.25		183.6	1.487^{15}	
1432	$C_6H_6S_2$	Dithioresorcinol 1, 3-$C_6H_4(SH)_2$	142.18	27	243		
1433	$C_6H_6S_2$	Dithiohydroquinone 1, 4-$C_6H_4(SH)_2$...	142.18	98			
1434	C_6H_7As	Phenylarsine $C_6H_5AsH_2$	154.01		148		
1435	$C_6H_7AsO_3$	Phenylarsonic acid. .	202.01	158 d.		1.840	
1436	$C_6H_7BrN_2$	*p*-Bromophenylhydrazine	186.99	107			
1437	$C_6H_7ClN_2$	4-Chloro-*o*-phenylenediamine	142.53	72			
1438	$C_6H_7ClN_2$	4-Chloro-*m*-phenylenediamine	142.53	86			
1439	$C_6H_7ClN_2$	*o*-Chlorophenylhydrazine	142.53	47			
1440	$C_6H_7ClN_2$	*p*-Chlorophenylhydrazine	142.53	90			
1441	C_6H_7ClO	Sorbic chloride.	130.51		78^{15}	1.065	**741**
1441.1	$C_6H_7ClO_4$	Methyl chloromaleate. . . .	178.51		106.5^{18}	1.278^{25}	
1441.2	$C_6H_7ClO_4$	Methyl chlorofumarate . . .	178.51		115.5^{18}	1.290^{25}	
1442	C_6H_7N	Aniline.	93.062	−6.2	184.4	1.022	**769**
1443	C_6H_7N	α-Picoline.	93.062	−69.9	128.0	0.950	**604**
1444	C_6H_7N	β-Picoline.	93.062		143.5	0.952	**1018**
1445	C_6H_7N	γ-Picoline	93.062		143.1	0.957	
1446	C_6H_7NO	*o*-Aminophenol	109.06	170			

* Commonly known as catechol, pyrocatechol, catechin, pyrocatechin.

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1447	C_6H_7NO	*m*-Aminophenol	109.06	123			
1448	C_6H_7NO	*p*-Aminophenol	109.06	184			1333
1449	C_6H_7NO	Methyl 2-pyrryl ketone	109.06	90	220		
1450	C_6H_7NO	β-Phenylhydroxylamine	109.06	82			
1451	$C_6H_7NO_2$	Phloramine 3, 5-$(OH)_2C_6H_3NH_2$	125.06	152			
1452	$C_6H_7NO_2S$	Benzenesulfoneamide	157.13	156			
1455	$C_6H_7NO_3S$	*p*-Anilinesulfonic acid	173.13	288			
1458	C_6H_7NS	2-Aminothiophenol	125.13	26	234		
1459	$C_6H_7N_3O_2$	4-Nitro-*o*-phenylenediamine	153.08	198			
1460	$C_6H_7N_3O_2$	4-Nitro-*m*-phenylenediamine	153.08	161			
1461	$C_6H_7N_3O_2$	2-Nitro-*p*-phenylenediamine	153.08	135			
1462	$C_6H_7N_5O_{16}$	*d*-Glucose pentanitrate	405.09	135 d.			
1463	$C_6H_7O_2P$	Phenylphosphenous acid	142.08	70			
1464	$C_6H_7O_3P$	Phenylphosphenic acid	158.08	158	250 d.	1.475	
1465	C_6H_7P	Phenyl phosphine $C_6H_5PH_2$	110.08		160	1.001^{15}	
1466	C_6H_8	1, 3-Cyclohexadiene	80.062	−98	80.5	0.842	519
1467	C_6H_8	Diallylene $(CH_2C:CH)_2$.	80.062		70	0.858$^{18.2}$	
1468	C_6H_8	*o*-Dihydrobenzene	80.062		78.5	0.848	
1469	C_6H_8	*m*-Dihydrobenzene	80.062		80.5	0.830	
1470	C_6H_8	*p*-Dihydrobenzene	80.062		85.5	0.848	
1471	$C_6H_8AsNO_3$	Arsanilic acid *p*-$NH_2C_6H_4AsO(OH)_2$.	217.03	<200			
1471.1	C_6H_8BrN	Aniline hydrobromide	173.99	286			
1472	C_6H_8ClN	Aniline hydrochloride	129.53	198	245	1.222^4	1245
1474	C_6H_8ClNO	*m*-Aminophenol hydrochloride	145.53	229			
1475	C_6H_8ClNO	*p*-Aminophenol hydrochloride	145.53	306 d.			1333
1476	$C_6H_8Cl_2O_2$	Adipyl dichloride	182.98		132^{18} s. d.		
1477	C_6H_9N	Piturine	94.070		244		
1478	$C_6H_8N_2$	Adipyldinitrile	108.08	1	295	0.951$^{19}_{19}$	471
1479	$C_6H_8N_2$	*o*-Phenylenediamine	108.08	103.8	252		
1480	$C_6H_8N_2$	*m*-Phenylenediamine	108.08	62.8	287	1.107$^{57.7}_4$	1086
1481	$C_6H_8N_2$	*p*-Phenylenediamine	108.08	139.7	267		
1482	$C_6H_8N_2$	2, 5-Dimethylpyrazine (Ketine)	108.08	15	155	0.990	1017
1483	$C_6H_8N_2$	Phenylhydrazine $C_6H_5NHNH_2$	108.08	19.6	243.5	1.098	784
1484	$C_6H_8N_2O$	2, 5-Diaminophenol	124.08	68			
1485	$C_6H_8N_2O$	3, 4-Diaminophenol	124.08	168			
1486	$C_6H_8N_2O$	3, 5-Diaminophenol	124.08	170			
1487	$C_6H_8N_2O_3$	1, 3-Dimethylbarbituric acid	156.08	123			
1488	$C_6H_8N_2O_3$	1-Ethylbarbituric acid	156.08	120			
1489	$C_6H_8N_2O_3$	Aniline nitrate	156.08		190 d.	1.358^4	
1490	$C_6H_8N_2O_3S$	*o*-Phenylenediamine-3-sulfonic acid	188.14	d.			
1491	$C_6H_8N_2O_3S$	*p*-Phenylhydrazinesulfonic acid	188.14	286			
1492	$C_6H_8N_2O_4S_2$	*o*-Benzenedisulfoneamide	236.21	233			
1493	$C_6H_8N_2O_4S_2$	*m*-Benzenedisulfoneamide	236.21	229			
1494	$C_6H_8N_2O_4S_2$	*p*-Benzenedisulfoneamide	236.21	188			
1495	$C_6H_8N_6O_{18}$	Mannitol hexanitrate	452.11	113		1.8	
1496	C_6H_8O	2, 5-Dimethylfuran	96.062		94	0.888	974
1497	$C_6H_8O_2$	Dihydroresorcinol *m*-$(OH)_2C_6H_6$	112.06	104			
1498	$C_6H_8O_2$	Sorbic acid $CH_3(CH:CH)_2CO_2H$	112.06	134.5	228 d.		1333
1499	$C_6H_8O_4$	Dimethyl fumarate	144.06	102	192		
1500	$C_6H_8O_4$	Dimethyl maleate	144.06		203	1.153^{14}	382
1501	$C_6H_8O_4$	Ethyl fumarate $CO_2HCH.CHCO_2C_2H_5$.	144.06	70			
1502	$C_6H_8O_4$	Lactide	144.06	125	255	0.862	
1503	$C_6H_8O_5$	Acetonylmalonic acid	160.06	150			
1504	$C_6H_8O_5$	Acetylmalic acid	160.06	134			
1504.1	$C_6H_8O_5$	1-Ketoadipic acid	160.06	124			
1505	$C_6H_8O_6$	Tricarballylic acid	176.06	166	d.		
1506	$C_6H_8O_6$	Glycerol triformate (Triformin)	176.06	18	266	1.320	373
1507	$C_6H_8O_7$	Citric acid $(HO_2CCH_2)_2C(OH)CO_2H$	192.06	153		1.542	1202
1508	$C_6H_8O_8$	Hydroxycitric acid	208.06	160			
1509	C_6H_8S	2, 3-Dimethylthiophene	112.13		137	0.994	
1510	C_6H_8S	2, 4-Dimethylthiophene	112.13		138	0.996	
1511	C_6H_8S	2, 5-Dimethylthiophene	112.13		137.5	0.976$^{17.5}$	
1512	C_6H_8S	3, 4-Dimethylthiophene	112.13		146	1.008$^{22}_{21.5}$	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1513	$C_6H_9AsO_6$	Arsenic acetate	252.03	82	170^{11}		
1514	$C_6H_9ClN_2$	Phenylhydrazine hydrochloride	144.54	243			
1515	$C_6H_9ClO_3$	Ethyl chloroacetoacetate	164.53		200	1.179^{22}_{22}	
1516	C_6H_9N	1, 2-Dimethylpyrrol	95.077		65^{14}		
1517	C_6H_9N	2, 3-Dimethylpyrrol	95.077		165		
1518	C_6H_9N	2, 4-Dimethylpyrrol	95.077		171	0.927^{14}_{4}	829
1519	C_6H_9N	2, 5-Dimethylpyrrol	95.077		169	0.935	909
1520	C_6H_9N	1-Ethylpyrrol	95.077		131	0.888^{16}	
1521	$C_6H_9NO_2$	Guavacine	127.08	285 d.			
1522	$C_6H_9NO_3$	Triacetamide $(CH_3CO)_3N$	143.08	79			
1523	$C_6H_9NO_3S$	Ammonium benzenesulfonate	175.14	256			
1524	$C_6H_9NO_6S$	*m*-Aminophenol sulfate	207.14	152			
1525	$C_6H_9N_3$	1, 2, 3-Triaminobenzene	123.09	103	336		
1526	$C_6H_9N_3$	1, 2, 4-Triaminobenzene	123.09	100	340		
1527	$C_6H_9N_3O$	2, 4, 6-Triaminophenol	139.09		257		
1528	$C_6H_9N_3O_2$	Cupferron	155.09	164			
1529	$C_6H_9N_3O_2$	Histidine	155.09	253 d.			
1530	$C_6H_9N_3O_3$	Phloroglucinol trioxime	171.09	155 exp.			
1531	$C_6H_9N_3O_4$	Caffuric acid	187.09	220			
1532	C_6H_{10}	*n*-Butylacetylene $C_4H_9C:CH$	82.077	−150	71.5		
1533	C_6H_{10}	Diisopropenyl $(CH_3C.CH_2)_2$	82.077		69.6	0.731^{15}	852
1534	C_6H_{10}	1, 5-Hexadiene $(CH_2CH:CH_2)_2$	82.077		60	0.688	127
1535	C_6H_{10}	2, 4-Hexadiene $(CH:CHCH_3)_2$	82.077		82	0.718	819
1536	C_6H_{10}	Methylpropylacetylene $CH_3CC:C_3H_7$	82.077		84	0.749^{0}	
1537	C_6H_{10}	1, 2, 3, 4-Tetrahydrobenzene	82.077	−103.7	83	0.810	404
1539	$C_6H_{10}ClN_3O_2$	Histidine hydrochloride	191.56	251 d.			
1540	$C_6H_{10}N_4O_{13}$	Tetranitrodiglycerol	316.11		250^{8}	1.33	
1541	$C_6H_{10}O$	Cyclohexanone	98.077		156.7	0.949	874
1542	$C_6H_{10}O$	1, 2, 3, 4-Tetrahydrophenol	98.077		166 d.		
1543	$C_6H_{10}O$	1, 2, 3, 6-Tetrahydrophenol	98.077		166		
1544	$C_6H_{10}O$	Allyl ether $(CH_2:CHCH_2)_2O$	98.077		94.3	0.805	
1545	$C_6H_{10}O$	1-Ethyl-2-methylacrolein	98.077		137.3	0.858	
1546	$C_6H_{10}O$	Allylacetone $CH_2:CH(CH_2)_2COCH_3$	98.077		129.5	0.846	876
1547	$C_6H_{10}O$	Diethylketene $(C_2H_5)_2C:CO$	98.077		89.5	0.831	
1548	$C_6H_{10}O$	Mesityl oxide $(CH_3)_2C:CHCOCH_3$	98.077	−59.0	135	0.863	899
1549	$C_6H_{10}O_2$	Adipyl dialdehyde $OCH(CH_2)_4CHO$	114.08		94^{9}		
1550	$C_6H_{10}O_2$	Propionylpropionic aldehyde	114.08	40	166		
1551	$C_6H_{10}O_2$	Acetonylacetone $(CH_3COCH_2)_2$	114.08	−9	194	0.970	428
1552	$C_6H_{10}O_2$	α-Ethylcrotonic acid	114.08	45	209		
1553	$C_6H_{10}O_2$	1, 2-Hexenic acid $C_3H_7CH:CHCO_2H$	114.08	32	217	0.965	1055
1554	$C_6H_{10}O_2$	2, 3-Hexenic acid	114.08		208	0.962	953
1555	$C_6H_{10}O_2$	1, 2-Isohexenic acid	114.08		108^{12}	0.959	885
1556	$C_6H_{10}O_2$	Crotonyl acetate	114.08		129	0.934^{0}	
1557	$C_6H_{10}O_2$	Ethyl α-crotonate	114.08		139	0.919	283
1558	$C_6H_{10}O_2$	Ethyl isocrotonate	114.08		131.2	0.925	
1559	$C_6H_{10}O_3$	Glyceryl ether	130.08		173	1.091	
1560	$C_6H_{10}O_3$	Propionic anhydride $(CH_3CH_2CO)_2O$	130.08	−45.0	196.0	1.012	142
1561	$C_6H_{10}O_3$	Ethyl acetoacetate	130.08	< −80	180	1.025	243
1562	$C_6H_{10}O_4$	Adipic acid $HO_2C(CH_2)_4CO_2H$	146.08	151	265^{100}		
1563	$C_6H_{10}O_4$	1, 1-Dimethylsuccinic acid	146.08	142	165 d.		
1564	$C_6H_{10}O_4$	Ethylsuccinic acid	146.08	98			
1565	$C_6H_{10}O_4$	Methylethylmalonic acid	146.08	117.5			
1566	$C_6H_{10}O_4$	Propylmalonic acid $C_3H_7CH(CO_2H)_2$	146.08	96			
1567	$C_6H_{10}O_4$	Isopropylmalonic acid	146.08	87			
1568	$C_6H_{10}O_4$	Dimethyl succinate $(CH_2CO_2CH_3)_2$	146.08	19.5	192.8	1.121	942
1569	$C_6H_{10}O_4$	Dimethyl isosuccinate	146.08		179	1.028^{26}_{26}	
1570	$C_6H_{10}O_4$	Diethyl oxalate $(CO_2C_2H_5)_2$	146.08	−40.6	186.1	1.080	182
1571	$C_6H_{10}O_4$	Glycol diacetate $(CH_2OCOCH_3)_2$	146.08	−31	190.5	1.104	216
1572	$C_6H_{10}O_4$	Ethylidene diacetate	146.08		169	0.852	
1572.1	$C_6H_{10}O_4$	Methyl *l*-1-acetoxypropionate	146.08		172	1.089	
1573	$C_6H_{10}O_4$	Mannide	146.08		317		
1574	$C_6H_{10}O_4$	Isomannide	146.08	87	274		
1575	$C_6H_{10}O_5$	Lactic anhydride $(CH_3CHOHCO)_2$	162.08	260 d.			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1576	$C_6H_{10}O_5$	Dimethyl malate	162 08		242	1.233	391
1577	$C_6H_{10}O_5$	β-Glucosan	162 08	178			
1578	$(C_6H_{10}O_5)_x$	Glycogen	$(162.08)_x$	240			
1578 1	$(C_6H_{10}O_5)_x$	Starch	$(162\ 08)_x$	d.		1.50^{21}	1164
1579	$C_6H_{10}O_5$	*d*-Saccharine	162 08	161			
1580	$C_6H_{10}O_6$	Dimethyl *dl*-tartrate $(CH(OH)CO_2CH_3)_2$	178 08	85	282		
1581	$C_6H_{10}O_6$	Dimethyl *d*-tartrate	178 08	48; 61 5	280	1 328	
1582	$C_6H_{10}O_6$	Ethyl *d*-tartrate	178 08	90			
1583	$C_6H_{10}O_8$	Allomucic acid	210 08	171 d.			
1584	$C_6H_{10}O_8$	Mucic acid $HO_2C(CHOH)_4CO_2H$	210 08	206 d.			
1585	$C_6H_{10}O_8$	*d*(*l*)-Talomucic acid	210 08	158 d.			
1586	$C_6H_{10}O_8$	Isosaccharic acid	210 08	185			
1587	$C_6H_{10}S$	Diallyl sulfide $(CH_2.CHCH_2)_2S$	114 14	−83 0	138 7	0 888$_4^{26.8}$	1034
1588	$C_6H_{11}Br$	Cyclohexyl bromide	163 00		165 5	1.333	575
1589	$C_6H_{11}BrN_2O_2$	Bromural	223 02	154			
1590	$C_6H_{11}BrO_2$	1-Bromocaproic acid $C_4H_9CHBrCO_2H$.	195 00		131^{10}		
1591	$C_6H_{11}BrO_2$	2-Bromocaproic acid	195 00	35			
1592	$C_6H_{11}BrO_2$	Ethyl 1-bromobutyrate	195 00		179 d.	1 325$_{25}^{25}$	
1593	$C_6H_{11}BrO_2$	Ethyl 1-bromoisobutyrate	195 00		164 d.	1 315$_{25}^{25}$	
1595	$C_6H_{11}Cl$	Cyclohexyl chloride	118 54		142 5	0 973	451
1596	$C_6H_{11}ClO$	*n*-Caproyl chloride $C_5H_{11}COCl$	134 54		153		543
1597	$C_6H_{11}ClO_2$	Isoamyl chloroformate	150 54		156	1 024$_{25}^{25}$	
1598	$C_6H_{11}Cl_2N_3O_2$	Histidine dihydrochloride	228 03	235 d.			
1599	$C_6H_{11}Cl_3O_2$	Trichloroacetal $Cl_3CCH(OC_2H_5)_2$	221 46		197	1.266^{15}	
1600	$C_6H_{11}Cl_3O_2$	Trichloroacetal (solid)	221 46	83	230 d.		
1601	$C_6H_{11}I$	Cyclohexyl iodide	210 02		192	1.626	
1602	$C_6H_{11}N$	Capronitrile $C_5H_{11}CN$	97 09		163	0.809	188
1603	$C_6H_{11}N$	Isocapronitrile $(CH_3)_2CH(CH_2)_2CN$	97 09	−51 1	155 5	0.806	159
1604	$C_6H_{11}N$	Isocaproisonitrile $(CH_3)_2CH(CH_2)_2NC$	97.09		137		
1605	$C_6H_{11}NO_2$	Hygric acid	129 09	169			
1606	$C_6H_{11}NO_2$	Nitrocyclohexane	129 09	−34	205 5	1 068	
1607	$C_6H_{11}NO_3$	Adipyl amide $HO_2C(CH_2)_4CONH_2$	145 09	130			
1608	$C_6H_{11}NS$	Isoamyl isothiocyanate	129 16		182		
1609	$C_6H_{11}N_3O_4$	Citramide $(H_2NOCCH_2)_2C(OH)CONH_2$	189 11	215			
1610	C_6H_{12}	Butylethylene $C_4H_9CH.CH_2$	84 092	−98 5	64 1	0.683	44
1611	C_6H_{12}	2, 2-Dimethyl-4-butene	84 092		42 3		
1612	C_6H_{12}	Cyclohexane	84 092	6 5	81 4	0.779	304
1613	C_6H_{12}	2-Methyl-2-pentene $(CH_3)_2C{:}CHC_2H_5$.	84 092		67 1	0.692	881
1615	C_6H_{12}	Methylcyclopentane	84 092	−140 5	73	0.750	
1616	C_6H_{12}	3-Methyl-2-pentene (isomer 1)	84 092		65 7	0.722^{15}	848
1617	C_6H_{12}	3-Methyl-2-pentene (isomer 2)	84 092		70.2	0 698	128
1618	C_6H_{12}	2, 3-Dimethyl-1-butene	84 092		59	0.680^{0}	
1619	C_6H_{12}	Tetramethylethylene	84 092		73	0 712	199
1620	$C_6H_{12}As_2$	Cacodyl carbide.	234 01		84 5^{15}		
1621	$C_6H_{12}As_3BiO_6$	Bismuth cacodylate $(8H_2O)$.	613 97	82			
1622	$C_6H_{12}Cl_2O_2$	Dichloroacetal $Cl_2CHCH(OC_2H_5)_2$	187 01		184	1 138^{14}	
1623	$C_6H_{12}N_2O_2$	Adipic diamide $H_2NOC(CH_2)_4CONH_2$.	144 11	220			
1624	$C_6H_{12}N_2O_2$	*sym*-Diethyloxamide	144 11	190			
1625	$C_6H_{12}N_2O_4S_2$	*l*-Cystine.	240 24	258 d.			1187
1626	$C_6H_{12}N_4$	Hexamethylenetetramine	140 12		263		
1627	$C_6H_{12}O$	Cyclohexanol.	100.09	23 9	161 5	0 962	1051
1628	$C_6H_{12}O$	2-Hexene-4-ol	100 09		59^{27}	0 837	1008
1629	$C_6H_{12}O$	Dimethyl propenyl carbinol	100.09		112	0 835	321
1630	$C_6H_{12}O$	Pinacolin $(CH_3)_3CCOCH_3$	100.09	−52 5	106.2	0 811	
1631	$C_6H_{12}O$	Ethyl isocrotonyl ether	100.09		94		
1632	$C_6H_{12}O$	Isopropyl allyl ether.	100.09		84 2	0 776	
1633	$C_6H_{12}O$	*n*-Caproic aldehyde $C_5H_{11}CHO$	100.09		129	0 834	
1634	$C_6H_{12}O$	Isobutylacetaldehyde	100.09		121.7		
1635	$C_6H_{12}O$	Methylpropylacetaldehyde	100 09		121		
1636	$C_6H_{12}O$	Ethyl propyl ketone $C_2H_5COC_3H_7$	100 09		124	0 818$^{17.5}$	124
1637	$C_6H_{12}O$	Ethyl isopropyl ketone	100 09		114.5	0 830$_0^0$	
1638	$C_6H_{12}O$	Methyl *n*-butyl ketone $CH_3COC_4H_9$.	100 09	−56 9	127.2	0 830^{0}	
1639	$C_6H_{12}O$	Methyl isobutyl ketone	100.09	−84.7	119	0.803	96

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1640	$C_6H_{12}O$	Methyl *sec.*-butyl ketone	100.09		117.8	0.815	115
1641	$C_6H_{12}O_2$	Diacetone alcohol	116.09		166	0.931^{25}	
1642	$C_6H_{12}O_2$	*tert.*-Butylacetic acid	116.09	−11	190		
1643	$C_6H_{12}O_2$	Caproic acid $C_5H_{11}CO_2H$	116.09	−9.5	202	0.929	207
1644	$C_6H_{12}O_2$	Isocaproic acid	116.09	−35	207.7	0.925	217
1645	$C_6H_{12}O_2$	Diethylacetic acid $(C_2H_5)_2CHCO_2H$	116.09	< −15	197	$0.933^{10.2}_{4}$	201
1646	$C_6H_{12}O_2$	Dimethylethylacetic acid	116.09	−14	187		
1647	$C_6H_{12}O_2$	Methylpropylacetic acid	116.09		193.5	0.928	
1648	$C_6H_{12}O_2$	*n*-Amyl formate $HCO_2C_5H_{11}$	116.09		130.4	0.902^{0}	
1649	$C_6H_{12}O_2$	Isoamyl formate	116.09		123.5	0.871	83
1650	$C_6H_{12}O_2$	*tert.*-Amyl formate	116.09		113	0.896^{15}	
1651	$C_6H_{12}O_2$	*n*-Butyl acetate $CH_3CO_2C_4H_9$	116.09	−76.8	126.5	0.882	95
1652	$C_6H_{12}O_2$	Isobutyl acetate $CH_3CO_2CH_2CH(CH_3)_2$	116.09	−98.9	118.3	0.871	118
1653	$C_6H_{12}O_2$	*sec.*-Butyl acetate	116.09		112.2	0.870	73
1654	$C_6H_{12}O_2$	Ethyl *n*-butyrate $C_3H_7CO_2C_2H_5$	116.09	−93.3	121.3	0.879	91
1655	$C_6H_{12}O_2$	Ethyl isobutyrate	116.09	−88.2	111.7	0.871	80
1656	$C_6H_{12}O_2$	Methyl trimethylacetate	116.09		102	1.044^{0}	
1657	$C_6H_{12}O_2$	Methyl *n*-valerate $C_4H_9CO_2CH_3$	116.09		127.3	0.910^{0}	
1658	$C_6H_{12}O_2$	Methyl isovalerate	116.09		116.7	0.881	
1659	$C_6H_{12}O_2$	*n*-Propyl propionate $C_2H_5CO_2C_3H_7$	116.09	−75.9	123.4	0.883	92
1660	$C_6H_{12}O_2$	Isopropyl propionate	116.09		111.3	0.893^{0}	
1661	$C_6H_{12}O_3$	Phloroglucite	132.09	185			
1662	$C_6H_{12}O_3$	Paraldehyde $(CH_3CHO)_3$	132.09	10.5	124	0.994	244
1663	$C_6H_{12}O_3$	1-Hydroxy-*n*-caproic acid	132.09	62			
1664	$C_6H_{12}O_3$	1-Hydroxyisocaproic acid	132.09	81			
1665	$C_6H_{12}O_3$	*dl*-1-Hydroxyisocaproic acid	132.09	76			
1666	$C_6H_{12}O_3$	1-Hydroxy-1, 1-diethylacetic acid	132.09	74.5			
1667	$C_6H_{12}O_3$	Methyl *n*-butyl carbonate	132.09		151		
1668	$C_6H_{12}O_5$	Fucose	164.09	145			
1669	$C_6H_{12}O_5$	Mannitan	164.09	137			
1670	$C_6H_{12}O_5$	*d*-Quercitol	164.09	234		1.585^{18}	
1671	$C_6H_{12}O_5$	*l*-Quercitol	164.09	174			
1672	$C_6H_{12}O_5\ (H_2O)$	*β*-Rhamnose	164.09	126		1.471	1219
1673	$C_6H_{12}O_5$	Rhodeose	164.09	144			
1674	$C_6H_{12}O_6$	*d*-Fructose (Levulose)	180.09	104		$1.669^{17.6}$	
1675	$C_6H_{12}O_6$	*d*, *α*-Galactose	180.09	168			
1675.1	$C_6H_{12}O_6$	*d*, *β*-Galactose	180.09	168			
1676	$C_6H_{12}O_6$	*dl*-Galactose	180.09	144			
1677	$C_6H_{12}O_6$	*d*, *α*-Glucose	180.09	146		1.544^{25}	
1678	$C_6H_{12}O_6$	*d*, *β*-Glucose	180.09	150			
1679	$C_6H_{12}O_6$	*d*(*l*)-Inosite	180.09	247	$250^{\text{vac.}}$		
1680	$C_6H_{12}O_6$	Dambose	180.09	224	d.	1.752	
1681	$C_6H_{12}O_6$	*α*-Mannose	180.09	133	205 d.		
1682	$C_6H_{12}O_6$	*d*-Mannose	180.09	132		1.539	
1683	$C_6H_{12}O_6$	*dl*-Mannose	180.09	133			
1684	$C_6H_{12}O_6$	*d*(*l*)-Sorbose	180.09	154		1.612	
1685	$C_6H_{12}O_6$	*dl*-Sorbose	180.09	154		1.638	
1686	$C_6H_{12}O_6$	*d*-Tagatose	180.09	124			
1687	$C_6H_{12}S$	Cyclohexyl mercaptan	116.16		160		
1688	$C_6H_{12}S_3$	*α*-Trithioacetaldehyde	180.29	101	247		
1689	$C_6H_{12}S_3$	*β*-Trithioacetaldehyde $(C_2H_4S)_3$	180.29	126			
1690	$C_6H_{12}S_3$	*γ*-Trithioacetaldehyde	180.29	81	100		
1690.1	$C_6H_{12}Se$	Hexamethyl selenide	163.29		172	1.122	
1691	$C_6H_{13}Br$	2-Bromo-2, 3-dimethylbutane	165.02	13	132		
1692	$C_6H_{13}Br$	*n*-Hexyl bromide $C_5H_{11}CH_2Br$	165.02		156	1.173	422
1693	$C_6H_{13}BrO_2$	Bromoacetal $BrCH_2CH(OC_2H_5)_2$	197.02		170		
1694	$C_6H_{13}Cl$	2-Chloro-2, 3-dimethylbutane	120.56	−10.4	112.1	0.875^{25}	
1695	$C_6H_{13}Cl$	*n*-Hexyl chloride $C_5H_{11}CH_2Cl$	120.56		134	0.872	238
1696	$C_6H_{13}ClN_4O_4$	Hexamethylenetetramine perchlorate	240.59	158			
1697	$C_6H_{13}I$	*n*-Hexyl iodide $C_5H_{11}CH_2I$	212.03		180	1.441	560
1698	$C_6H_{13}IO_2$	Iodoacetal $ICH_2CH(OC_2H_5)_2$	244.03		132^{90}	1.494^{15}	
1699	$C_6H_{13}N$	1-Methylpiperidine	99.108		107	0.818	416
1700	$C_6H_{13}N$	2-Methylpiperidine (*α*-Pipecoline)	99.108		119	$0.844^{23.6}$	1016

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1701	$C_6H_{13}N$	3-Methylpiperidine (β-Pipecoline).	99.108		126	$0.845^{24.3}$	1020
1702	$C_6H_{13}N$	4-Methylpiperidine (γ-Pipecoline).....	99.108		129	0.867^{0}	
1703	$C_6H_{13}NO_2$	Hedonal $H_2NCO_2CH(CH_3)C_3H_7$...	131.11	74	215		
1704	$C_6H_{13}NO_2$	Isoamyl carbamate	131.11	63.5	220		
1704.1	$C_6H_{13}NO_2$	Propyl urethane $C_3H_7NHCO_2C_2H_5$	131.11		186	0.992^{15}	
1705	$C_6H_{13}NO_2$	*l*-Leucine $(CH_3)_2CHCH(NH_2)CO_2H$	131.11	295		1.293	1221
1706	$C_6H_{13}NO_2$	*dl*-Leucine	131.11	290			
1707	$C_6H_{13}NO_2$	*d*(*l*)-Isoleucine	131.11	280 d.			
1708	$C_6H_{13}NO_2$	*dl*-Isoleucine	131.11	275			
1709	$C_6H_{13}NO_5$	*d*-Glucosamine	179.11	110 d.			
1710	$C_6H_{13}NO_5$	*d*-Glucosimine.	179.11	128			
1711	$C_6H_{13}NO_6$	*d*-Glucosoxime.	195.11	138			
1712	C_6H_{14}	Diisopropyl $(CH_3)_2CHCH(CH_3)_2$	86.108	−135.1	58.1	0.666^{15}	38
1713	C_6H_{14}	*n*-Hexane $CH_3(CH_2)_4CH_3$	86.108	−94.3	69.0	0.660	32
1714	C_6H_{14}	3-Methylpentane $(C_2H_5)_2CHCH_3$	86.108		64	0.668	34
1715	C_6H_{14}	2-Methylpentane $(CH_3)_2CHC_3H_7$	86.108		60.0	0.654	27
1716	C_6H_{14}	2, 2-Dimethylbutane $(CH_3)_3CC_2H_5$.	86.108	−98.2	49.7	0.649	23
1717	$C_6H_{14}INO_5$	*d*-Glucosamine hydroiodide	307.05	165 d.			
1718	$C_6H_{14}N_2$	α, 2, 5-Dimethylpiperazine	114.12	119	162		
1719	$C_6H_{14}N_2O$	Diacetoneamineoxime	130.12	58	135^{17}		
1720	$C_6H_{14}N_2O$	Dipropylnitrosamine $(C_3H_7)_2NNO$	130.12		205		
1721	$C_6H_{14}N_2O_7$	Ammonium citrate	226.12			1.483	
1722	$C_6H_{14}N_4O_2$	Arginine	174.14	207.5 d.			
1723	$C_6H_{14}O$	*tert*-Amyl carbinol	102.11		135	0.844^{0}_{4}	
1724	$C_6H_{14}O$	Isohexyl alcohol	102.11		165	0.840^{0}_{4}	429
1725	$C_6H_{14}O$	Dimethylisopropyl carbinol	102.11	−14	122	0.823	
1726	$C_6H_{14}O$	Ethylpropyl carbinol	102.11		135	0.819	
1726.1	$C_6H_{14}O$	*l*(*d*)-Ethylpropyl carbinol	102.11		134^{733}	$0.825^{13.5}$	211
1727	$C_6H_{14}O$	Ethylisopropyl carbinol	102.11		128	0.824	
1728	$C_6H_{14}O$	*n*-Hexyl alcohol $C_6H_{13}OH$	102.11	−51.6	155.8	0.820	
1730	$C_6H_{14}O$	Methylbutyl carbinol	102.11		131.9	0.803^{25}_{4}	183
1730.1	$C_6H_{14}O$	*d*-Methylbutyl carbinol	102.11		138	0.815	205
1732	$C_6H_{14}O$	Methyl-*sec.*-butyl carbinol	102.11		134	0.831^{18}	245
1733	$C_6H_{14}O$	Pinacolyl alcohol $(CH_3)_3CH(OH)CH_3$	102.11	5.5	121	0.812^{25}	
1733.1	$C_6H_{14}O$	*d*-Pinacolyl alcohol	102.11		120	0.820	214
1734	$C_6H_{14}O$	Methyldiethyl carbinol	102.11	−22	122.6	0.824	242
1735	$C_6H_{14}O$	3-Methyl-3-ethylpropyl alcohol	102.11		152.1	0.830^{15}	
1736	$C_6H_{14}O$	2-Methyl-2-propylethyl alcohol	102.11		147.9	0.829	231
1737	$C_6H_{14}O$	Ethyl *n*-butyl ether $C_4H_9OC_2H_5$	102.11		91.4	0.752	
1738	$C_6H_{14}O$	Ethyl isobutyl ether..	102.11		80	0.751	
1739	$C_6H_{14}O$	Methyl *n*-amyl ether $C_5H_{11}OCH_3$	102.11		88.5	0.754	53
1740	$C_6H_{14}O$	Methyl isoamyl ether	102.11		91	0.687^{91}_{4}	
1741	$C_6H_{14}O$	Propyl ether $(C_3H_7)_2O$	102.11	−122.0	89	0.747	41
1742	$C_6H_{14}O$	Isopropyl ether $[(CH_3)_2CH]_2O$	102.11		68.7	$0.735^{16.2}$	
1743	$C_6H_{14}O_2$	Pinacone $[(CH_3)_2COH]_2$	118.11	38	172.8		
1744	$C_6H_{14}O_2$	Hexane-1, 5-diol	118.11		233	0.981^{0}	
1745	$C_6H_{14}O_2$	Hexane-1, 6-diol $HOCH_2(CH_2)_4CH_2OH$	118.11	42	250		
1746	$C_6H_{14}O_2$	Acetal $CH_3CH(OC_2H_5)_2$	118.11		102.2	0.831	42
1747	$C_6H_{14}O_5$	Diglycerol $[(HO)_2C_3H_5]_2O$	166.11		230^{10}		
1748	$C_6H_{14}O_5$	Fucitol	166.11	153			
1749	$C_6H_{14}O_5$	Rhamnitol	166.11	121			
1750	$C_6H_{14}O_6$	Dulcitol	182.11	188	$295^{3.5}$	1.466^{15}	1333
1751	$C_6H_{14}O_6$	*d*-Mannitol	182.11	166.1	$295^{3.5}$	1.489	1333
1752	$C_6H_{14}O_6$	*d*-Sorbitol	182.11	110			1333
1753	$C_6H_{14}O_6$	*d*-Talitol	182.11	86			
1754	$C_6H_{14}S$	Dipropyl sulfide $(C_3H_7)_2S$	118.17		142	0.814	
1755	$C_6H_{14}S$	Diisopropyl sulfide $[(CH_3)_2CH]_2S$.	118.17		120.4		
1756	$C_6H_{15}As$	Triethyl arsine $(C_2H_5)_3As$............	162.08		141 d.	1.150	495
1757	$C_6H_{15}AsO_3$	Triethyl arsenite $(C_2H_5O)_3As$....	210.08		166	1.224^{0}_{4}	
1758	$C_6H_{15}AsO_4$	Triethyl arsenate $(C_2H_5O)_3AsO$......	226.08		238	1.326^{0}	
1759	$C_6H_{15}Bi$	Triethyl bismuthine $(C_2H_5)_3Bi$.	296.12		107^{79}	1.82	
1760	$C_6H_{15}N$	Di-*n*-propylamine $(C_3H_7)_2NH$	101.12	−39.6	110.7	0.738	149
1761	$C_6H_{15}N$	Diisopropylamine $[(CH_3)_2CH]_2NH$.....	101.12		84	0.722^{22}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
1762	$C_6H_{15}N$	*n*-Hexylamine $C_6H_{13}NH_2$	101.12		128		
1762.1	$C_6H_{15}N$	2-Hexylamine $C_4H_9CH(NH_2)CH_3$	101.12	−19	130^{142}	$0.767^{10.4}$	
1763	$C_6H_{15}N$	Isohexylamine $(CH_3)_2CH(CH_2)_3NH_2$	101.12	−94.4	123.9		
1764	$C_6H_{15}N$	Triethylamine $(C_2H_5)_3N$	101.12	−114.8	89.5	0.728	129
1765	$C_6H_{15}NO_2$	Aminoacetal $H_2NCH_2CH(OC_2H_5)_2$	133.12		163		
1766	$C_6H_{15}N_3$	Acetaldehydeammonia (trimeric)	129.14	85			
1767	$C_6H_{15}O_3P$	Triethyl phosphite $(C_2H_5O)_3P$	166.14		156.5	$1.076^{12.4}$	169
1768	$C_6H_{15}O_4P$	Triethyl phosphate $(C_2H_5O)_3PO$	182.14		216	1.072^{12}	150
1769	$C_6H_{15}P$	Triethylphosphine $(C_2H_5)_3P$	118.14		128	0.800	413
1769.1	$C_6H_{15}PS$	Triethyl phosphinesulfide	150.20	94			1182
1770	$C_6H_{15}Sb$	Triethyl stibine $(C_2H_5)_3Sb$	208.89		159.5	1.324^{16}	
1771	$C_6H_{16}ClN$	Triethylamine hydrochloride	137.59	254		1.069	
1772	$C_6H_{16}N_2$	Hexamethylenediamine $H_2N(CH_2)_6NH_2$	116.14	39	196		
1773	$C_6H_{18}N_6O_4S$	1, 1-Dimethylguanidine sulfate	270.25	288 d.			
1775	$C_7HCl_5O_2$	Pentachlorobenzoic acid $C_6Cl_5CO_2H$	294.30	201			
1776	$C_7H_2Br_4O_2$	2, 3, 4, 6-Tetrabromobenzoic acid	437.68	171			
1777	$C_7H_2Cl_4O_2$	2, 3, 4, 5-Tetrachlorobenzoic acid	259.85	186			
1778	$C_7H_3Br_3O_2$	2, 3, 4-Tribromobenzoic acid	358.77	198			
1779	$C_7H_3Br_3O_2$	2, 3, 5-Tribromobenzoic acid	358.77	194			
1780	$C_7H_3Br_3O_2$	2, 4, 5-Tribromobenzoic acid	358.77	196			
1781	$C_7H_3Br_3O_2$	2, 4, 6-Tribromobenzoic acid	358.77	187			
1782	$C_7H_3Br_3O_2$	3, 4, 5-Tribromobenzoic acid	358.77	235			
1783	$C_7H_3Cl_3O_2$	2, 3, 4-Trichlorobenzoic acid	225.40	129			
1784	$C_7H_3Cl_3O_2$	2, 3, 5-Trichlorobenzoic acid	225.40	163			
1785	$C_7H_3Cl_3O_2$	2, 4, 5-Trichlorobenzoic acid	225.40	163			
1786	$C_7H_3Cl_3O_2$	2, 4, 6-Trichlorobenzoic acid	225.40	160			
1787	$C_7H_3Cl_3O_2$	3, 4, 5-Trichlorobenzoic acid	225.40	203			
1788	$C_7H_3N_3O_7$	2, 4, 6-Trinitrobenzaldehyde	241.05	119			
1789	$C_7H_3N_3O_8$	2, 4, 6-Trinitrobenzoic acid	257.05	190			
1790	C_7H_4BrClO	*o*-Bromobenzoyl chloride	219.41		243		
1791	C_7H_4BrClO	*m*-Bromobenzoyl chloride	219.41		239		
1792	C_7H_4BrClO	*p*-Bromobenzoyl chloride	219.41	42	247 s. d.		
1793	C_7H_4BrN	*o*-Bromobenzonitrile	181.96	51	253		
1794	C_7H_4BrN	*m*-Bromobenzonitrile	181.96	38	225		
1795	C_7H_4BrN	*p*-Bromobenzonitrile	181.96	113	237		
1796	$C_7H_4Br_2O_2$	2, 3-Dibromobenzoic acid	279.86	150			
1797	$C_7H_4Br_2O_2$	2, 4-Dibromobenzoic acid	279.86	169			
1798	$C_7H_4Br_2O_2$	2, 5-Dibromobenzoic acid	279.86	153			
1799	$C_7H_4Br_2O_2$	2, 6-Dibromobenzoic acid	279.86	147			
1800	$C_7H_4Br_2O_2$	3, 4-Dibromobenzoic acid	279.86	230			
1801	$C_7H_4Br_2O_2$	3, 5-Dibromobenzoic acid	279.86	214			
1802	$C_7H_4Br_2O_5$	2, 6-Dibromo-3, 4, 5-trihydroxybenzoic acid	327.86	150			
1803	C_7H_4ClFO	*o*-Fluorobenzoyl chloride	158.49		206		
1804	C_7H_4ClFO	*m*-Fluorobenzoyl chloride	158.49		189		
1805	C_7H_4ClFO	*p*-Fluorobenzoyl chloride *p*-FC_6H_4COCl	158.49		193		
1806	$C_7H_4ClNO_3$	*o*-Nitrobenzoyl chloride	185.50	75	205^{105}		
1807	$C_7H_4ClNO_3$	*m*-Nitrobenzoyl chloride	185.50	34	278		
1808	$C_7H_4ClNO_3$	*p*-Nitrobenzoyl chloride	185.50	72	154^{15}		
1809	$C_7H_4Cl_2O$	2, 4-Dichlorobenzaldehyde	174.95	71			
1810	$C_7H_4Cl_2O$	2, 5-Dichlorobenzaldehyde	174.95	58	233	1.231^{70}	
1811	$C_7H_4Cl_2O$	3, 4-Dichlorobenzaldehyde	174.95	44	248		
1812	$C_7H_4Cl_2O$	*o*-Chlorobenzoyl chloride	174.95	−4	238		
1813	$C_7H_4Cl_2O$	*m*-Chlorobenzoyl chloride	174.95		117.5^{26}		
1814	$C_7H_4Cl_2O$	*p*-Chlorobenzoyl chloride	174.95		$119^{27.5}$		
1815	$C_7H_4Cl_2O_2$	2, 3-Dichlorobenzoic acid	190.95	166			
1816	$C_7H_4Cl_2O_2$	2, 4-Dichlorobenzoic acid	190.95	164.2			
1817	$C_7H_4Cl_2O_2$	2, 5-Dichlorobenzoic acid	190.95	154.4	301		
1818	$C_7H_4Cl_2O_2$	2, 6-Dichlorobenzoic acid	190.95	143.7			
1819	$C_7H_4Cl_2O_2$	3, 4-Dichlorobenzoic acid	190.95	204.1			
1820	$C_7H_4Cl_2O_2$	3, 5-Dichlorobenzoic acid	190.95	188.1			
1821	$C_7H_4Cl_3NO_2$	2, 3, 4-Trichloronitrotoluene	240.41	60			
1822	$C_7H_4Cl_4$	2-Chloro-1-trichloromethylbenzene	229.86	30	260	1.51	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I No.
1823	$C_7H_4FNO_4$	2-Fluoro-5-nitrobenzoic acid	185.04	139			
1824	$C_7H_4FNO_4$	3-Fluoro-4-nitrobenzoic acid	185.04	122			
1825	$C_7H_4FNO_4$	3-Fluoro-6-nitrobenzoic acid	185.04	134.5			
1826	$C_7H_4FNO_4$	4-Fluoro-2-nitrobenzoic acid	185.04	130			
1827	$C_7H_4FNO_4$	4-Fluoro-3-nitrobenzoic acid	185.04	121.5			
1828	$C_7H_4I_2O_3$	3, 5-Diiodosalicylic acid	389.90	230 d.			
1829	$C_7H_4N_2O_2$	*o*-Nitrobenzonitrile	148.05	109			
1830	$C_7H_4N_2O_2$	*m*-Nitrobenzonitrile	148.05	118			
1831	$C_7H_4N_2O_2$	*p*-Nitrobenzonitrile	148.05	147			
1832	$C_7H_4N_2O_5$	2, 4-Dinitrobenzaldehyde	196.05	72			
1833	$C_7H_4N_2O_5$	2, 6-Dinitrobenzaldehyde	196.05	123			
1834	$C_7H_4N_2O_6$	2, 3-Dinitrobenzoic acid	212.05	201			
1835	$C_7H_4N_2O_6$	2, 4-Dinitrobenzoic acid	212.05	179			
1836	$C_7H_4N_2O_6$	2, 5-Dinitrobenzoic acid	212.05	177			
1837	$C_7H_4N_2O_6$	2, 6-Dinitrobenzoic acid	212.05	202 d.			
1838	$C_7H_4N_2O_6$	3, 4-Dinitrobenzoic acid	212.05	163			
1839	$C_7H_4N_2O_6$	3, 5-Dinitrobenzoic acid	212.05	205			
1840	$C_7H_4N_2O_7$	3, 5-Dinitro-2-hydroxybenzoic acid	228.05	174			
1841	$C_7H_4N_4O_9$	2, 3, 5, 6-Tetranitroanisol	288.06	154; 112			
1842	$C_7H_4O_5S$	*o*-Sulfobenzoic anhydride	184.10	130			
1843	$C_7H_4O_7$	Meconic acid	200.03		d.		1333
1844	C_7H_5BrO	Benzoyl bromide C_6H_5COBr	184.96	0	219	1.570	
1845	$C_7H_5BrO_2$	*o*-Bromobenzoic acid	200.96	148			
1846	$C_7H_5BrO_2$	*m*-Bromobenzoic acid	200.96	152			
1847	$C_7H_5BrO_2$	*p*-Bromobenzoic acid	200.96	251			
1848	$C_7H_5BrO_3$	3-Bromo-2-hydroxybenzoic acid	216.96	220			
1849	$C_7H_5BrO_3$	5-Bromo-2-hydroxybenzoic acid	216.96	165			
1850	$C_7H_5Br_3$	2, 3, 4-Tribromotoluene	328.79	45			
1851	$C_7H_5Br_3$	2, 3, 5-Tribromotoluene	328.79	54			
1852	$C_7H_5Br_3$	2, 3, 6-Tribromotoluene	328.79	59			
1853	$C_7H_5Br_3$	2, 4, 5-Tribromotoluene	328.79	113			
1854	$C_7H_5Br_3$	2, 4, 6-Tribromotoluene	328.79	66			
1855	$C_7H_5Br_3$	3, 4, 5-Tribromotoluene	328.79	89			
1856	C_7H_5ClO	*o*-Chlorobenzaldehyde	140.50	−3	205	1.252	753
1857	C_7H_5ClO	*m*-Chlorobenzaldehyde	140.50	18	204	1.241	751
1858	C_7H_5ClO	*p*-Chlorobenzaldehyde	140.50	47.5	214	1.196^{61}	1092
1859	C_7H_5ClO	Benzoyl chloride C_6H_5COCl	140.50	−0.8	197.2	1.211	737
1860	$C_7H_5ClO_2$	*o*-Chlorobenzoic acid	156.50	140.7			
1861	$C_7H_5ClO_2$	*m*-Chlorobenzoic acid	156.50	154.9			
1862	$C_7H_5ClO_2$	*p*-Chlorobenzoic acid	156.50	241.5			
1863	$C_7H_5ClO_2$	Salicyl chloride *o*-HOC_6H_4COCl	156.50	18.0	59^{10} s. d.		
1864	$C_7H_5ClO_3$	5-Chloro-2-hydroxybenzoic acid	172.50	167.5			
1865	$C_7H_5Cl_2NO_2$	*m*-Nitrobenzal chloride	205.96	65			
1866	$C_7H_5Cl_2NO_4S$	Halazone	270.03	213			
1868	$C_7H_5Cl_3$	*o*-Chlorobenzal chloride	195.41		228.5	1.399^{15}	
1869	$C_7H_5Cl_3$	*p*-Chlorobenzal chloride	195.41		234		
1870	$C_7H_5Cl_3$	Benzotrichloride $C_6H_5CCl_3$	195.41	−4.8	220.7	1.378^{15}_{4}	
1871	$C_7H_5Cl_3$	2, 3, 4-Trichlorotoluene	195.41	41	234		
1872	$C_7H_5Cl_3$	2, 4, 5-Trichlorotoluene	195.41	82	232		
1873	$C_7H_5Cl_3$	3, 4, 5-Trichlorotoluene	195.41	42.5	247		
1874	$C_7H_5Cl_3O$	2, 4, 6-Trichloro-3-hydroxytoluene	211.41	46			
1875	$C_7H_5Cl_3O$	2, 4, 6-Trichloroanisol	211.41	60.5	240.7		
1876	C_7H_5FO	Benzoyl fluoride C_6H_5COF	124.04		162		
1877	$C_7H_5FO_2$	*o*-Fluorobenzoic acid	140.04	122			
1878	$C_7H_5FO_2$	*m*-Fluorobenzoic acid	140.04	124			
1879	$C_7H_5FO_2$	*p*-Fluorobenzoic acid	140.04	182			
1880	C_7H_5IO	Benzoyl iodide C_6H_5COI	231.97	3	135^{25}		
1881	$C_7H_5IO_2$	*o*-Iodobenzoic acid	247.97	162			
1882	$C_7H_5IO_2$	*m*-Iodobenzoic acid	247.97	185			
1883	$C_7H_5IO_2$	*p*-Iodobenzoic acid	247.97	266			
1884	$C_7H_5IO_3$	3-Iodo-2-hydroxybenzoic acid	263.97	198			
1885	C_7H_5N	Benzonitrile C_6H_5CN	103.05	−13.1	190.7	$1.008^{16.8}$	1028
1886	C_7H_5N	Phenyl isocyanide C_6H_5NC	103.05		166 d.	0.978^{15}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
1887	C_7H_5NO	Anthranil	119.05	> −18	215	1.187^{18}_{4}	768
1888	C_7H_5NO	Benzoxazol	119.05	30.5	182.5		
1889	C_7H_5NO	Phenyl isocyanate $C_6H_5N:CO$	119.05		165.6	1.005	
1890	C_7H_5NO	Salicylic nitrile *o*-OHC_6H_4CN	119.05	98			
1891	C_7H_5NOS	1-Hydroxybenzothiazole	151.11	136			
1892	C_7H_5NOS	1-Mercaptobenzoxazole	151.11	193			
1893	$C_7H_5NO_3$	*o*-Nitrobenzaldehyde	151.05	α40.9; β37.9	156^{18}		
1894	$C_6H_5NO_3$	*m*-Nitrobenzaldehyde	151.05	58.0	164^{23}		
1895	$C_7H_5NO_3$	*p*-Nitrobenzaldehyde	151.05	106.5			
1896	$C_7H_5NO_3S$	*o*-Benzoicsulfimide (Saccharin)	183.11	228 d.			
1897	$C_7H_5NO_4$	*o*-Nitrobenzoic acid	167.05	147.5		1.575^{4}	
1898	$C_7H_5NO_4$	*m*-Nitrobenzoic acid	167.05	141.4		1.494^{4}	
1899	$C_7H_5NO_4$	*p*-Nitrobenzoic acid	167.05	242.4		1.550^{32}_{4}	
1900	$C_7H_5NO_4$	Quinolinic acid	167.05	190 d.			
1901	$C_7H_5NO_4$	Lutidinic acid	167.05	248			
1902	$C_7H_5NO_4$	Isocinchomeronic acid	167.05	237			
1903	$C_7H_5NO_4$	Dipicolinic acid	167.05	226 d			
1904	$C_7H_5NO_4$	Cinchomeronic acid	167.05	258 d			
1905	$C_7H_5NO_4$	Dinicotinic acid	167.05	323			
1906	$C_7H_5NO_5$	Ammonchelidonic acid	183.05	220 d.			
1907	$C_7H_5NO_5$	3-Nitro-2-hydroxybenzoic acid	183.05	144			
1908	$C_7H_5NO_5$	4-Nitro-2-hydroxybenzoic acid	183.05	235			
1909	$C_7H_5NO_5$	5-Nitro-2-hydroxybenzoic acid	183.05	228			
1910	$C_7H_5NO_5$	6-Nitro-2-hydroxybenzoic acid	183.05	130			
1911	$C_7H_5NO_5$	2-Nitro-3-hydroxybenzoic acid	183.05	178			
1912	$C_7H_5NO_5$	4-Nitro-3-hydroxybenzoic acid	183.05	230			
1913	$C_7H_5NO_5$	5-Nitro-3-hydroxybenzoic acid	183.05	167			
1914	$C_7H_5NO_5$	6-Nitro-3-hydroxybenzoic acid	183.05	169			
1915	$C_7H_5NO_5$	3-Nitro-4-hydroxybenzoic acid	183.05	185			
1916	C_7H_5NS	Benzothiazol	135.11		230	1.248	
1917	C_7H_5NS	Phenyl thiocyanate C_6H_5CNS	135.11		232	1.155	
1918	C_7H_5NS	Phenyl isothiocyanate $C_6H_5N:CS$	135.11	−21	218.5	$1.135^{15.5}$	798
1919	$C_7H_5N_3$	1, 2, 3-Benzotriazin	131.06	75	240		
1920	$C_7H_5N_3O_6$	Chrysanisic acid	227.06	259			
1921	$C_7H_5N_3O_6$	2, 3, 4-Trinitrotoluene	227.06	112	302 d.	1.620	
1922	$C_7H_5N_3O_6$	2, 3, 5-Trinitrotoluene	227.06	97	335 d.		
1923	$C_7H_5N_3O_6$	2, 3, 6-Trinitrotoluene	227.06	111	333 d.		
1924	$C_7H_5N_3O_6$	2, 4, 6-Trinitrotoluene (T. N. T.)	227.06	80.7	240 exp	1.654	
1925	$C_7H_5N_3O_6$	3, 4, 5-Trinitrotoluene	227.06	137.5	313 d.		
1926	$C_7H_5N_3O_6$	3, 4, 6-Trinitrotoluene	227.06	104	291 d.	1.620	
1927	$C_7H_5N_3O_7$	2, 3, 4-Trinitroanisol	243.06	155	exp.		
1928	$C_7H_5N_3O_7$	2, 3, 5-Trinitroanisol	243.06	104		1.618^{15}	
1929	$C_7H_5N_3O_7$	2, 4, 6-Trinitroanisol	243.06	68.4		1.408	
1930	$C_7H_5N_3O_7$	3, 4, 5-Trinitroanisol	243.06	120			
1931	$C_7H_5N_3O_7$	3, 4, 6-Trinitroanisol	243.06	107			
1932	$C_7H_5N_3O_7$	2, 4, 6-Trinitro-3-hydroxytoluene	243.06	106			
1933	$C_7H_5N_5O_8$	2, 4, 6-Trinitrophenylmethylnitramine (Tetryl)	287.08	130	exp. 187		
1934	C_7H_6BrCl	*o*-Bromobenzyl chloride	205.42		115^{15}		
1935	C_7H_6BrCl	*p*-Bromobenzyl chloride	205.42	51			
1936	C_7H_6BrCl	*o*-Chlorobenzyl bromide	205.42		120^{10}		
1937	C_7H_6BrCl	*p*-Chlorobenzyl bromide	205.42	48			
1938	C_7H_6BrNO	*o*-Bromobenzamide	199.97	156			
1939	C_7H_6BrNO	*m*-Bromobenzamide	199.97	150			
1940	C_7H_6BrNO	*p*-Bromobenzamide	199.97	190			
1941	$C_7H_6BrNO_2$	*o*-Nitrobenzyl bromide	215.97	46			
1942	$C_7H_6BrNO_2$	*m*-Nitrobenzyl bromide	215.97	58			
1943	$C_7H_6BrNO_2$	*p*-Nitrobenzyl bromide	215.97	100			
1944	$C_7H_6Br_2$	Benzal bromide $C_6H_5CHBr_2$	249.88		140^{20}	1.51^{15}	716.1
1945	$C_7H_6Br_2$	*o*-Bromobenzyl bromide	249.88	30			
1946	$C_7H_6Br_2$	*m*-Bromobenzyl bromide	249.88	41			
1947	$C_7H_6Br_2$	*p*-Bromobenzyl bromide	249.88	61			
1948	$C_7H_6Br_2$	2, 3-Dibromotoluene	249.88	31			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No
1949	$C_7H_6Br_2$	2, 6-Dibromotoluene	249.88	5.5	246	1.812^{22}	
1950	$C_7H_6Br_2$	3, 5-Dibromotoluene	249.88	39			
1951	C_7H_6ClNO	*o*-Chlorobenzamide	155.51	141			
1952	C_7H_6ClNO	*m*-Chlorobenzamide	155.51	134.5			
1953	C_7H_6ClNO	*p*-Chlorobenzamide	155.51	178.3			
1954	$C_7H_6ClNO_2$	3-Chloro-2-nitrotoluene	171.51	23			
1955	$C_7H_6ClNO_2$	4-Chloro-2-nitrotoluene	171.51	38.2	242	1.256^{80}	
1956	$C_7H_6ClNO_2$	5-Chloro-2-nitrotoluene	171.51	44	250		
1957	$C_7H_6ClNO_2$	6-Chloro-2-nitrotoluene	171.51	37	238		
1958	$C_7H_6ClNO_2$	2-Chloro-3-nitrotoluene	171.51	21.5	263		
1959	$C_7H_6ClNO_2$	4-Chloro-3-nitrotoluene	171.51	7	260.5	1.297^{22}	
1960	$C_7H_6ClNO_2$	5-Chloro-3-nitrotoluene	171.51	61			
1961	$C_7H_6ClNO_2$	*o*-Nitrobenzyl chloride	171.51	49			1093
1962	$C_7H_6ClNO_2$	*m*-Nitrobenzyl chloride	171.51	44.5	183^{35}		1094
1963	$C_7H_6ClNO_2$	*p*-Nitrobenzyl chloride	171.51	71			1095
1964	$C_7H_6Cl_2$	Benzal chloride $C_6H_5CHCl_2$	160.96	−17.4	214	1.295^{16}	
1965	$C_7H_6Cl_2$	*o*-Chlorobenzyl chloride	160.96		214		
1966	$C_7H_6Cl_2$	*p*-Chlorobenzyl chloride	160.96	29	214		
1967	$C_7H_6Cl_2O$	1, 4-Dichloro-2-hydroxytoluene	176.96	82			
1968	$C_7H_6Cl_2O$	3, 5-Dichloro-2-hydroxytoluene	176.96	55			
1969	$C_7H_6Cl_2O$	4, 6-Dichloro-3-hydroxytoluene	176.96	46			
1970	$C_7H_6Cl_2O_2$	4, 5-Dichloro-2-methoxyphenol	192.96	72	270		
1971	C_7H_6FNO	*o*-Fluorobenzamide	139.05	116			
1972	C_7H_6FNO	*m*-Fluorobenzamide	139.05	130			
1973	C_7H_6FNO	*p*-Fluorobenzamide	139.05	154.5			
1974	C_7H_6INO	*o*-Iodobenzamide	246.99	183.6			
1975	C_6H_6INO	*m*-Iodobenzamide	246.99	186.5			
1976	C_7H_6INO	*p*-Iodobenzamide	246.99	217.6			
1977	$C_7H_6N_2$	Benzimidazol	118.06	170	<360		1270
1978	$C_7H_6N_2$	Cyanilide $CNNHC_6H_5$	118.06	47			
1979	$C_7H_6N_2$	Indazole	118.06	146.5	270.6		
1980	$C_7H_6N_2O_2$	Ricininic acid	150.06	298			
1981	$C_7H_6N_2O_3$	*o*-Nitrobenzamide	166.06	176.6	317	1.462^{22}_4	
1982	$C_7H_6N_2O_3$	*m*-Nitrobenzamide	166.06	142.7	315		
1983	$C_7H_6N_2O_3$	*p*-Nitrobenazmide	166.06	201.4			
1984	$C_7H_6N_2O_4$	2, 3-Dinitrotoluene	182.06	59.3		1.263^{111}	
1985	$C_7H_6N_2O_4$	2, 4-Dinitrotoluene	182.06	69.6	300 s. d.	1.521^{15}	1297
1986	$C_7H_6N_2O_4$	2, 5-Dinitrotoluene	182.06	50.5		1.282^{111}	
1987	$C_7H_6N_2O_4$	2, 6-Dinitrotoluene	182.06	61		1.283^{111}	1300
1988	$C_7H_6N_2O_4$	3, 4-Dinitrotoluene	182.06	59.8		1.259^{111}	
1989	$C_7H_6N_2O_4$	3, 5-Dinitrotoluene	182.06	93		1.277^{111}	
1990	$C_7H_6N_2O_5$	2, 4-Dinitroanisol	198.06	95.2		1.341	
1991	$C_7H_6N_2O_5$	2, 5-Dinitroanisol	198.06	97.0	360	1.476	
1992	$C_7H_6N_2O_5$	2, 6-Dinitroanisol	198.06	117.5		1.319	
1993	$C_7H_6N_2O_5$	3, 4-Dinitroanisol	198.06	69.3		1.334^{110}	
1994	$C_7H_6N_2O_5$	3, 5-Dinitroanisol	198.06	105.8		1.558^{12}	
1995	$C_7H_6N_2O_5$	2, 4-Dinitro-3-hydroxytoluene	198.06	99			
1996	$C_7H_6N_2O_5$	3, 5-Dinitro-4-hydroxytoluene	198.06	85.8			
1997	$C_7H_6N_2O_6$	4, 6-Dinitro-2-methoxyphenol	214.06	123			
1998	$C_7H_6N_2O_7S$	2, 6-Dinitrotoluene-4-sulfonic acid	262.13	165			
1999	$C_7H_6N_2S$	1-Aminobenzothiazole	150.13	127			
2000	$C_7H_6N_4O_7$	2, 4, 6-Trinitro-3-aminoanisol	258.08	131			
2001	C_7H_6O	Benzaldehyde C_6H_5CHO	106.05	−56.0	179.5	1.046	725
2002	C_7H_6OS	Thiobenzoic acid C_6H_5COSH	138.11	24			
2003	$C_7H_6O_2$	Furfuracrolein	122.05	51	200		
2004	$C_7H_6O_2$	Salicyl aldehyde *o*-HOC_6H_4CHO	122.05	−7	196.5	1.167	759
2005	$C_7H_6O_2$	*m*-Hydroxybenzaldehyde	122.05	106.0	240		
2006	$C_7H_6O_2$	*p*-Hydroxybenzaldehyde	122.05	116.0		1.129^{130}	
2007	$C_7H_6O_2$	Benzoic acid $C_6H_5CO_2H$	122.05	121.7	249.2	1.266^{15}_4	1160, 1333
2008	$C_7H_6O_2$	Phenyl formate $HCO_2C_6H_5$	122.05		173	1.088	
2009	$C_7H_6O_2$	Toluquinone $CH_3C_6H_3O_2$	122.05	69			
2010	$C_7H_6O_2S$	Thiosalicylic acid *o*-$SHC_6H_4CO_2H$	154.11	164			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2011	$C_7H_6O_3$	2, 3-Dihydroxybenzaldehyde	138.05	108	235		
2012	$C_7H_6O_3$	3, 4-Dihydroxybenzaldehyde	138.05	154			
2013	$C_7H_6O_3$	Salicylic acid *o*-$HOC_6H_4CO_2H$	138.05	159	s. 76	1.443	1333
2014	$C_7H_6O_3$	*m*-Hydroxybenzoic acid	138.05	201.3		1.473^{4}	
2015	$C_7H_6O_3$	*p*-Hydroxybenzoic acid.	138.05	213		1.468^{4}	
2016	$C_7H_6O_4$	2, 3-Dihydroxybenzoic acid	154.05	204			
2017	$C_7H_6O_4$	2, 4-Dihydroxybenzoic acid	154.05	206			
2018	$C_7H_6O_4$	2, 5-Dihydroxybenzoic acid	154.05	200			
2019	$C_7H_6O_4$	2, 6-Dihydroxybenzoic acid	154.05	167 d.			
2020	$C_7H_6O_4$	3, 4-Dihydroxybenzoic acid	154.05	199		1.542^{4}	
2021	$C_7H_6O_4$	3, 5-Dihydroxybenzoic acid	154.05	227			
2022	$C_7H_6O_5$	Pyrogallolcarboxylic acid	170.05	200 d.			
2023	$C_7H_6O_5$	Gallic acid 3, 4, 5-$(HO)_3C_6H_2CO_2H$	170.05	220 d	d	1.694^{4}	1333
2024	$C_7H_6O_5S$	*o*-Sulfobenzoic acid.	202.11	141			
2025	$C_7H_6O_5S$	*m*-Sulfobenzoic acid $HO_3SC_6H_4CO_2H$	202.11	141			
2026	$C_7H_6O_5S$	*p*-Sulfobenzoic acid $HO_3SC_6H_4CO_2H$	202.11	200			
2027	$C_7H_6O_6S$	Salicylsulfonic acid... ...	218.11	120			
2028	$C_7H_7AsCl_2$	Benzyl arsine dichloride	236.93		175^{30}		
2029	C_7H_7Br	Benzyl bromide.......	170.97	−4.0	199	1.438^{22}_{0}	
2030	C_7H_7Br	*o*-Bromotoluene	170.97	−28.1	181.8	1.422	738
2031	C_7H_7Br	*m*-Bromotoluene... .	170.97	−39.8	183.7	1.410	734
2032	C_7H_7Br	*p*-Bromotoluene.... ...	170.97	28	183.6	1.310	732
2033	C_7H_7BrO	5-Bromo-2-hydroxytoluene	186.97	64	235		
2034	C_7H_7BrO	5-Bromo-3-hydroxytoluene	186.97	62			
2035	C_7H_7BrO	3-Bromo-4-hydroxytoluene	186.97		214	$1.547^{24.5}$	
2036	$C_7H_7BrO_2$	6-Bromo-2-methoxyphenol	202.97	63			
2037	$C_7H_7BrO_2$	4-Bromo-2-methoxyphenol	202.97	46	182^{40}		
2038	C_7H_7Cl	Benzyl chloride	126.51	−39	179.4	1.103^{18}	711
2039	C_7H_7Cl	*o*-Chlorotoluene .	126.51	−35.1	159.4	1.080	691
2040	C_7H_7Cl	*m*-Chlorotoluene . ..	126.51	−47.8	162.4	1.072	672
2041	C_7H_7Cl	*p*-Chlorotoluene	126.51	7.8	162.5	1.071^{18}	666
2042	C_7H_7ClO	*o*-Chlorobenzyl alcohol .	142.51	72	230		
2043	C_7H_7ClO	*m*-Chlorobenzyl alcohol .	142.51		234		
2044	C_7H_7ClO	*p*-Chlorobenzyl alcohol	142.51	70.5	235		
2045	C_7H_7ClO	3-Chloro-2-hydroxytoluene	142.51	86	225		
2046	C_7H_7ClO	4-Chloro-2-hydroxytoluene	142.51	49	225		
2047	C_7H_7ClO	5-Chloro-2-hydroxytoluene	142.51	49	220		
2048	C_7H_7ClO	4-Chloro-3-hydroxytoluene.	142.51	66	235		
2049	C_7H_7ClO	6-Chloro-3-hydroxytoluene	142.51	53	235		
2050	C_7H_7ClO	2-Chloro-4-hydroxytoluene	142.51		196	1.211^{25}_{25}	
2051	C_7H_7ClO	3-Chloro-4-hydroxytoluene... .	142.51	55	228		
2052	$C_7H_7ClO_2$	4(5)-Chloro-2-methoxyphenol	158.51	< −18	241.5		
2053	$C_7H_7ClO_2S$	Toluene-*o*-sulfonechloride	190.58	10	126^{21}	1.339	
2054	$C_7H_7ClO_2S$	Toluene-*p*-sulfonechloride	190.58	69	146^{15}		
2055	$C_7H_7ClO_3S$	2-Chlorotoluene-5-sulfonic acid	206.58	78			
2056	$C_7H_7Cl_2NO_2S$	Toluene-*p*-sulfonedichloroamine	240.04	83			
2057	C_7H_7F	*o*-Fluorotoluene	110.05	< −80	114	1.001	505
2058	C_7H_7F	*m*-Fluorotoluene .	110.05	−110.8	116	0.999	500
2059	C_7H_7F	*p*-Fluorotoluene ..	110.05		117	$1.001^{15.4}$	502
2060	C_7H_7I	Benzyl iodide .	217.99	24.1	d.	1.733^{25}	
2061	C_7H_7I	*o*-Iodotoluene . .	217.99		211	1.697	785
2062	C_7H_7I	*m*-Iodotoluene ...	217.99		204	1.698	
2063	C_7H_7I	*p*-Iodotoluene.	217.99	35	211.5		
2064	C_7H_7IO	*o*-Iodoanisol *o*-$CH_3OC_6H_4I$	233.99		240	1.800	
2065	$C_7H_7IO_2$	5-Iodo-2-methoxyphenol	249.99	88			
2066	$C_7H_7IO_2$	4-Iodo-2-methoxyphenol .	249.99	43	180 d.	1.5	
2067	C_7H_7NO	*o*-Aminobenzaldehyde	121.06	40			
2068	C_7H_7NO	*m*-Aminobenzaldehyde.	121.06	71.5			
2069	C_7H_7NO	*p*-Aminobenzaldehyde	121.06	71			
2070	C_7H_7NO	*syn*-Benzaldoxime $C_6H_5C{:}NOH$.	121.06	130			
2071	C_7H_7NO	*anti*-Benzaldoxime $C_6H_5C{:}NOH$ ..	121.06	35	153^{63}	1.111	972
2072	C_7H_7NO	Benzamide $C_6H_5CONH_2$	121.06	130	290	1.341^{4}	
2073	C_7H_7NO	Formanilide $HCONHC_6H_5$............	121.06	47.5	271	1.112^{60}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2074	$C_7H_7NO_2$	Anthranilic acid *o*-$H_2NC_6H_4CO_2H$	137.06	145			
2075	$C_7H_7NO_2$	*m*-Aminobenzoic acid	137 06	174		1.511^{4}	
2076	$C_7H_7NO_2$	*p*-Aminobenzoic acid	137 06	187			
2077	$C_7H_7NO_2$	Benzohydroxamic acid	137.06	125			
2078	$C_7H_7NO_2$	*o*-Hydroxybenzamide	137 06	140	270 d.		
2079	$C_7H_7NO_2$	*m*-Hydroxybenzamide	137 06	170.5			
2080	$C_7H_7NO_2$	*p*-Hydroxybenzamide	137.06	162			
2081	$C_7H_7NO_2$	*o*-Nitrotoluene	137.06	α −10.6; β −4.1	222 3	1.168^{15}	724
2082	$C_7H_7NO_2$	*m*-Nitrotoluene	137.06	15.5	231	1.164_4^{15}	729
2083	$C_7H_7NO_2$	*p*-Nitrotoluene	137 06	51.3	238	1.098^{80}	1096
2084	$C_7H_7NO_2$	Phenylnitromethane	137 06		227	1.160	702
2085	$C_7H_7NO_3$	*o*-Nitrobenzyl alcohol	153 06	74	168^{20}		
2086	$C_7H_7NO_3$	*m*-Nitrobenzyl alcohol	153 06	27	180^{3}		
2087	$C_7H_7NO_3$	*p*-Nitrobenzyl alcohol	153 06	93	185^{12}		
2088	$C_7H_7NO_3$	3-Nitro-*o*-cresol	153.06	145			
2089	$C_7H_7NO_3$	4-Nitro-*o*-cresol	153 06	94.6			
2090	$C_7H_7NO_3$	5-Nitro-*o*-cresol	153 06	118			
2091	$C_7H_7NO_3$	6-Nitro-*o*-cresol	153.06	69 5			
2093	$C_7H_7NO_3$	4-Nitro-*m*-cresol	153.06	129			
2094	$C_7H_7NO_3$	5-Nitro-*m*-cresol	153 06	91			
2095	$C_7H_7NO_3$	6-Nitro-*m*-cresol	153 06	56			
2096	$C_7H_7NO_3$	3-Nitro-4-hydroxytoluene	153.06	36 5	125^{22}	$1\ 240_4^{19}$	1053
2098	$C_7H_7NO_3$	*o*-Nitroanisol	153.06	9.4	277	1.268	749
2099	$C_7H_7NO_3$	*m*-Nitroanisol	153.06	38	258	1 373	
2100	$C_7H_7NO_3$	*p*-Nitroanisol	153.06	54	260	1.233	
2101	$C_7H_7NO_3$	4-Amino-2-hydroxybenzoic acid	153.06	220			
2102	$C_7H_7NO_3$	5-Amino-2-hydroxybenzoic acid	153.06	280 d.			
2103	$C_7H_7NO_4$	6-Nitro-2-methoxyphenol	169.06	62			
2104	$C_7H_7NO_4$	5-Nitro-2-methoxyphenol	169.06	104			
2105	$C_7H_7NO_4$	3-Nitro-2-methoxyphenol	169.06	103			
2106	$C_7H_7NO_4S$	*o*-Sulfoaminobenzoic acid	201.13	167			
2107	$C_7H_7NO_4S$	*m*-Sulfoaminobenzoic acid	201.13	238			
2108	$C_7H_7NO_4S$	*p*-Sulfoaminobenzoic acid.	201.13	280 d.			
2109	$C_7H_7NO_5S$	*p*-Nitrotoluene-*o*-sulfonic acid	217.13	130			
2110	C_7H_7NS	Thiobenzamide $C_6H_5CSNH_2$	137.13	116			
2111	C_7H_8	Tropylidene	92.062		118	0.888	686
2112	C_7H_8	Toluene	92.062	−95 1	110.5	0 866	579
2114	C_7H_8BrN	4-Bromo-*o*-toluidine	185.99	32	257 d.		
2115	C_7H_8BrN	5-Bromo-*o*-toluidine	185.99	59 5	240		
2116	C_7H_8BrN	5-Bromo-*m*-toluidine	185.99	36	260	1.144^{19}	
2117	C_7H_8BrN	6-Bromo-*m*-toluidine	185.99	78.8	240		
2118	C_7H_8BrN	2-Bromo-*p*-toluidine	185.99	26	257		
2119	C_7H_8BrN	3-Bromo-*p*-toluidine	185.99	26	240	1.498	
2120	C_7H_8ClN	4-Chloro-*o*-toluidine.	141.53	22	238.5		
2120 1	C_7H_8ClN	5-Chloro-*o*-toluidine	141.53	30	239 2		
2121	C_7H_8ClN	6-Chloro-*o*-toluidine.	141.53		245		
2122	C_7H_8ClN	2-Chloro-*m*-toluidine	141.53		229		
2123	C_7H_8ClN	4-Chloro-*m*-toluidine	141.53	30	230		
2124	C_7H_8ClN	5-Chloro-*m*-toluidine	141.53		243		
2125	C_7H_8ClN	6-Chloro-*m*-toluidine	141.53	83	241		
2126	C_7H_8ClN	2-Chloro-*p*-toluidine	141.53	26	245		
2127	C_7H_8ClN	3-Chloro-*p*-toluidine	141.53		219	1.151	
2128	$C_7H_8N_2$	Benzalhydrazine $C_6H_5CH_2NHNH_2$	120.08	16	140^{11}		
2129	$C_7H_8N_2$	Benzamidine $C_6H_5C(:NH)NH_2$.	120.08	80			
2130	$C_7H_8N_2O$	*o*-Aminobenzamide	136.08	108			
2131	$C_7H_8N_2O$	*m*-Aminobenzamide	136.08	79			
2132	$C_7H_8N_2O$	*p*-Aminobenzamide $NH_2C_6H_4CONH_2$.	136.08	183			
2133	$C_7H_8N_2O$	Benzoylhydrazine $C_6H_5CONHNH_2$	136.08	112			
2134	$C_7H_8N_2O$	Nitrosomethylaniline	136.08	15	225 d.	$1\ 121_4^{22.7}$	998
2135	$C_7H_8N_2O$	Phenylurea $C_6H_5NHCONH_2$	136.08	147			1330
2136	$C_7H_8N_2O_2$	*o*-Nitromethylaniline	152.08	34			
2137	$C_7H_8N_2O_2$	*m*-Nitromethylaniline	152.08	66			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2138	$C_7H_8N_2O_2$	*p*-Nitromethylaniline	152 08	152		1 201$^{156\ 9}$	
2139	$C_7H_8N_2O_2$	3-Nitro-*o*-toluidine	152 08	96		1.190^{100}	
2140	$C_7H_8N_2O_2$	4-Nitro-*o*-toluidine	152 08	105		1.365^{15}	
2141	$C_7H_8N_2O_2$	5-Nitro-*o*-toluidine	152 08	127 5		1.366^{16}	
2142	$C_7H_8N_2O_2$	6-Nitro-*o*-toluidine	152 08	91 5		1.378^{15}	
2143	$C_7H_8N_2O_2$	2-Nitro-3-aminotoluene	152 08	53			
2144	$C_7H_8N_2O_2$	4-Nitro-3-aminotoluene	152 08	109			
2145	$C_7H_8N_2O_2$	5-Nitro-3-aminotoluene	152 08	98 4			
2146	$C_7H_8N_2O_2$	6-Nitro-3-aminotoluene	152 08	138			
2147	$C_7H_8N_2O_2$	2-Nitro-4-aminotoluene	152 08	77 5			
2148	$C_7H_8N_2O_2$	3-Nitro-*p*-toluidine	152 08	117		1.312^{17}	
2149	$C_7H_8N_2O_3$	5-Nitro-3-amino-4-hydroxytoluene	168.08	110			
2150	$C_7H_8N_2S$	Phenylthiourea $C_6H_5NHCSNH_2$	152.14	154			
2151	$C_7H_8N_4O_2$	Theophylline	180 09	272			
2152	$C_7H_8N_4O_2$	Paraxanthine	180 09	299			
2153	$C_7H_8N_4O_2$	Theobromine	180 09	337			
2154	$C_7H_8N_4O_3$	1, 3-Dimethyluric acid	196.09	410 d.			
2155	$C_7H_8N_4O_3$	1, 7-Dimethyluric acid	196 09	390 d.			
2156	$C_7H_8N_4O_3$	1, 9-Dimethyluric acid	196 09	400 d			
2157	$C_7H_8N_4O_3$	3, 9-Dimethyluric acid	196 09	340 d.			
2158	$C_7H_8N_6O_7$	Guanidine picrate	288.11	290			
2159	C_7H_8O	Benzyl alcohol $C_6H_5CH_2OH$	108 06	−15 3	205 8	1.046	713
2160	C_7H_8O	*o*-Cresol	108 06	30 1	190 8	1 051	727
2161	C_7H_8O	*m*-Cresol	108 06	10	202 8	1.035	714
2162	C_7H_8O	*p*-Cresol	108.06	34 8	201 1	1 039$^{15\ 4}$	715
2163	C_7H_8O	Phenyl methyl ether (Anisol)	108 06	−37 3	155 8	0 994	659
2164	C_7H_8O	4, 6-Dihydrobenzaldehyde	108 06	< −20	171 5 d.	1 020$^{14\ 8}$	
2165	C_7H_8OS	Thioguaiacol $CH_3OC_6H_4SH$	140.13		219		
2166	$C_7H_8O_2$	*o*-Hydroxybenzyl alcohol	124.06	86		1 161	
2167	$C_7H_8O_2$	*m*-Hydroxybenzyl alcohol	124 06	67	300 d.		
2168	$C_7H_8O_2$	*p*-Hydroxybenzyl alcohol	124.06	110			
2169	$C_7H_8O_2$	2, 4-Dihydroxytoluene	124 06	104			
2170	$C_7H_8O_2$	2, 5-Dihydroxytoluene	124.06	125			
2171	$C_7H_8O_2$	2, 6-Dihydroxytoluene	124 06	66			
2172	$C_7H_8O_2$	Homocatechol 3, 4-$(HO)_2C_6H_3CH_3$	124.06	65	252	1.129$^{74}_{4}$	1103
2173	$C_7H_8O_2$	Orcinol 3, 5-$(HO)_2C_6H_3CH_3$	124.06	108	290	1 290^{4}	
2174	$C_7H_8O_2$	Guaiacol *o*-$HOC_6H_4OCH_3$	124.06	28	205 1	1 143^{15}	1179
2175	$C_7H_8O_2$	Resorcinol methyl ether	124.06	< −17 5	244 3	> 1	
2176	$C_7H_8O_2$	Hydroquinol methyl ether	124.06	53	243		
2176 1	$C_7H_8O_2$	Dimethyl-γ-pyrone	124 06	132		0 9953^{137}	
2178	$C_7H_8O_2$	Furfurylacetone	124.06	40	229		
2179	$C_7H_8O_2S$	Toluene-*o*-sulfinic acid	156.13	80			
2180	$C_7H_8O_3$	2, 5-Dimethylfurfurane-3-carboxylic acid (Uvinic acid)	140.06	135			
2181	$C_7H_8O_3S$	Toluene-*o*-sulfonic acid	172.13		128 8^{25}		
2183	$C_7H_8O_3S$	Toluene-*p*-sulfonic acid	172.13	105	140^{20}		
2184	$C_7H_8O_4$	Iretol 2, 4, 6-$(OH)_3C_6H_2OCH_3$	156 06	186			
2185	$C_7H_8O_4$	Hydrochelidonic anhydride	156 06	69	210		
2186	$C_7H_8O_4S$	4-Hydroxytoluene-2-sulfonic acid	188 13	188			
2187	$C_7H_8O_4S$	2-Hydroxytoluene-6-sulfonic acid	188 13	118			
2188	$C_7H_8O_6$	Cinchonic acid	188 06	169			
2189	C_7H_8S	Benzyl mercaptan $C_6H_5CH_2SH$	124.13		195	1 058^{20}	
2190	C_7H_8S	*o*-Thiocresol *o*-$CH_3C_6H_4SH$	124.13	15	194 3		
2191	C_7H_8S	*m*-Thiocresol *m*-$CH_3C_6H_4SH$	124.13	< −20	195 4	1 052$^{12}_{4}$	
2192	C_7H_8S	*p*-Thiocresol *p*-$CH_3C_6H_4SH$	124.13	43	195		
2193	$C_7H_9AsO_3$	Benzylarsonic acid $C_6H_5CH_2AsO(OH)_2$	216.03	167			
2194	$C_7H_9ClN_4O_2$	Theobromine hydrochloride	216.56				1333
2195	C_7H_9N	Benzylamine $C_6H_5CH_2NH_2$	107.08		184	0.980	720
2196	C_7H_9N	2, 4-Lutidine	107.08		157	0.949$^{0}_{4}$	
2197	C_7H_9N	2, 6-Lutidine	107.08		143	0.942^{0}	
2198	C_7H_9N	3, 4-Lutidine	107.08		164 5		
2199	C_7H_9N	2-Ethylpyridine	107.08		148.8	0.950	990
2200	C_7H_9N	3-Ethylpyridine	107.08		165.3	0.959	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2201	C_7H_9N	*4-Ethylpyridine*	107.08		166	0.936	
2202	C_7H_9N	*α-Lutidine*	107.08		156.5	0.947^{0}	
2203	C_7H_9N	Methylaniline $C_6H_5NHCH_3$	107.08	−57.0	195.70	0.986	757
2204	C_7H_9N	*o*-Toluidine *o*-$CH_3C_6H_4NH_2$	107.08	α −24.4; β −16.3	200.7	0.998	758
2205	C_7H_9N	*m*-Toluidine *m*-$CH_3C_6H_4NH_2$	107.08	−31.5	203.3	0.989	989
2206	C_7H_9N	*p*-Toluidine *p*-$CH_3C_6H_4NH_2$	107.08	43.7	200.5	1.046	1087
2207	C_7H_9NO	*o*-Aminobenzyl alcohol	123.08	82	280 s. d.		
2208	C_7H_9NO	*p*-Aminobenzyl alcohol	123.08	95			
2209	C_7H_9NO	4-Amino-2-hydroxytoluene	123.08	161			
2210	C_7H_9NO	5-Amino-2-hydroxytoluene	123.08	175			
2211	C_7H_9NO	6-Amino-2-hydroxytoluene	123.08	128			
2212	C_7H_9NO	5-Amino-*m*-cresol	123.08	79	345		
2213	C_7H_9NO	4-Amino-3-hydroxytoluene	123.08	174			
2214	C_7H_9NO	2-Amino-4-hydroxytoluene	123.08	144.5			
2215	C_7H_9NO	3-Amino-4-hydroxytoluene	123.08	135			
2216	C_7H_9NO	*o*-Anisidine *o*-$CH_3OC_6H_4NH_2$	123.08	5.2	224	1.108^{26}	
2217	C_7H_9NO	*m*-Anisidine *m*-$CH_3OC_6H_4NH_2$	123.08		251		
2218	C_7H_9NO	*p*-Anisidine *p*-$CH_3OC_6H_4NH_2$	123.08	57.7	245	1.071_{4}^{55}	
2219	C_7H_9NO	Benzylhydroxylamine $C_6H_5CH_2NHOH$	123.08		123^{50}		
2220	C_7H_9NO	Salicylamine *o*-$OHC_6H_4CH_2NH_2$	123.08	129			
2221	C_7H_9NO	*m*-Tolylhydroxylamine	123.08	68			
2222	C_7H_9NO	*p*-Tolylhydroxylamine	123.08	94			
2223	C_7H_9NO	4, 6-Dihydrobenzaldoxime	123.08	44			
2224	$C_7H_9NO_2$	6-Amino-2-methoxyphenol	139.08	127			
2225	$C_7H_9NO_2$	Ammonium benzoate $C_6H_5CO_2NH_4$	139.08	198		1.262^{4}	
2226	$C_7H_9NO_2S$	Toluene-*o*-sulfoneamide	171.14	156.3			
2227	$C_7H_9NO_2S$	Toluene-*m*-sulfoneamide	171.14	108			
2228	$C_7H_9NO_2S$	Toluene-*p*-sulfoneamide	171.14	137.5			
2229	$C_7H_9NO_3$	Ammonium salicylate	155.08				1333
2234.1	$C_7H_9NO_5S$	Ammonium *o*-sulfobenzoate	219.14	> 250		1.524	1200
2235	$C_7H_9N_3O$	1-Phenylsemicarbazide	151.09	172			
2236	$C_7H_9N_3O$	4-Phenylsemicarbazide	151.09	122			
2237	C_7H_{10}	2, 3-Dihydrocycloheptene	94.077		121		
2238	C_7H_{10}	1, 2-Dihydrotoluene	94.077		108		
2239	C_7H_{10}	1, 3-Dihydrotoluene	94.077		110.1	0.835	524
2240	C_7H_{10}	2, 4-Dihydrotoluene	94.077		106	0.827	498
2241	C_7H_{10}	1, 3, 5-Heptatriene	94.077		114	0.764	
2243	$C_7H_{10}ClN$	*o*-Toluidine hydrochloride	143.54	214.5	242		
2244	$C_7H_{10}ClN$	*m*-Toluidine hydrochloride	143.54	228	249.8		
2245	$C_7H_{10}ClN$	*p*-Toluidine hydrochloride	143.54	239	257.5		
2247	$C_7H_{10}N_2$	Methyl-*p*-phenylenediamine	122.09	35.5	259.5		
2248	$C_7H_{10}N_2$	Benzylhydrazine $C_6H_5CH_2NHNH_2$	122.09	26	103^{41}		
2249	$C_7H_{10}N_2$	2, 3-Diaminotoluene	122.09	62	255		
2250	$C_7H_{10}N_2$	2, 4-Diaminotoluene	122.09	99	280		
2251	$C_7H_{10}N_2$	2, 5-Diaminotoluene	122.09	64	274		
2252	$C_7H_{10}N_2$	Toluylene-2, 6-diamine	122.09	105			
2253	$C_7H_{10}N_2$	3, 4-Diaminotoluene	122.09	88.5	265		
2254	$C_7H_{10}N_2$	3, 5-Diaminotoluene	122.09		285		
2255	$C_7H_{10}N_2$	1, 1-Methylphenylhydrazine	122.09		227.5	1.040	766
2256	$C_7H_{10}N_2$	*o*-Tolylhydrazine *o*-$CH_3C_6H_4NHNH_2$	122.09	56			
2257	$C_7H_{10}N_2$	*m*-Tolylhydrazine	122.09		224		
2258	$C_7H_{10}N_2$	*p*-Tolylhydrazine *p*-$CH_3C_6H_4NHNH_2$	122.09	61			
2259	$C_7H_{10}N_2O_3$	5-Ethyl-5-methylbarbituric acid	170.09	212			
2260	$C_7H_{10}N_2O_3$	Trimethylbarbituric acid	170.09	165			
2260.1	$C_7H_{10}N_4O_5$	Dimethyl ureindihydroxysuccinate	234.10	203			1204
2260.2	$C_7H_{10}N_2O_7$	Isohydroxydimethylurea	230.11	180			1212
2261	$C_7H_{10}O$	1, 2, 3, 4-Tetrahydrobenzaldehyde	110.08		212	1.009^{0}	
2262	$C_7H_{10}O_2$	Δ^1-Tetrahydrobenzoic acid	126.08			$1.072_{4}^{47.2}$	552
2263	$C_7H_{10}O_3$	Diacetylacetone $CO(CH_2COCH_3)_2$	142.08	49	121^{10}	1.068_{40}^{40}	1090
2264	$C_7H_{10}O_4$	*cis*-Pentamethylene-1, 2-dicarboxylic acid	158.08	140			
2265	$C_7H_{10}O_4$	Teraconic acid	158.08	161 d.			
2266	$C_7H_{10}O_4$	Terebic acid	158.08	175		0.816	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2267	$C_7H_{10}O_4$	Dimethyl citraconate	158.08		210.5	1.110	922
2268	$C_7H_{10}O_5$	3-Ketopimelic acid	174.08	143			
2269	$C_7H_{10}O_5$	Ethyl mesoxalate $(HO)_2C(CO_2C_2H_5)_2$.	174.08	< -31	220	1.110^{20}_{20}	
2270	$C_7H_{10}O_5$	Quinic lactone	174.08	187			
2271	$C_7H_{11}BrO_4$	Diethyl bromomalonate	239.00		235	1.426^{15}_{15}	
2272	$C_7H_{11}NO$	Nortropinone	125.09	70			
2273	$C_7H_{11}NO_2$	Arecaidine	141.09	224 d.			
2274	$C_7H_{11}NO_2$	Arecaine	141.09	214 d.			
2275	C_7H_{12}	*n*-Amylacetylene $C_5H_{11}C{:}CH$	96.092	> -70	110.5	$0.738^{11.6}_4$	160
2276	C_7H_{12}	2, 4-Dimethyl-1, 3-pentadiene	96.092		93.3	0.749^{12}_4	815
2277	C_7H_{12}	2, 4-Dimethyl-2, 3-pentadiene	96.092		70		
2278	C_7H_{12}	3-Heptine $C_3H_7C{:}CC_2H_5$	96.092		106	0.760^0	
2279	C_7H_{12}	2, 4-Heptadiene	96.092		107	0.731	896
2280	C_7H_{12}	2-Heptine $CH_3C{:}CC_4H_9$	96.092		113.3	0.763^0	
2281	C_7H_{12}	4-Methylcyclohexene	96.092		102.2	0.800	385
2282	C_7H_{12}	Δ^1-Tetrahydrotoluene	96.092		111	0.800	431
2283	C_7H_{12}	Δ^2-Tetrahydrotoluene	96.092		105	0.805	408
2284	C_7H_{12}	Δ^3-Tetrahydrotoluene	96.092		103	0.799	394
2284.1	$C_7H_{12}Cl_2O_2$	Isobutyl 1, 2-dichloropropionate	199.01			1.156^{21}	
2285	$C_7H_{12}N_2O$	Sinapoline	140.11	100			
2286	$C_7H_{12}N_4O$	Caffeidine	168.12	94			
2287	$C_7H_{12}N_4O_3$	Caffoline	200.12	197			
2288	$C_7H_{12}O$	Diallyl carbinol $(CH_2{:}CHCH)_2CHOH$.	112.09		151	0.857	
2289	$C_7H_{12}O$	Hexahydrobenzaldehyde	112.09		161	0.926	
2289.1	$C_7H_{12}O$	*o*-Methylcyclohexanone	112.09		167^{740}	$0.930^{15.1}$	842
2289.2	$C_7H_{12}O$	*m*-Methylcyclohexanone	112.09		60^{15}	$0.914^{25.2}$	1027
2289.3	$C_7H_{12}O$	*p*-Methylcyclohexanone	112.09		$56.4^{10.5}$	$0.912^{24.4}$	1021
2290	$C_7H_{12}O$	Suberone $<(CH_2CH_2CH_2)_2>CO$	112.09		179.5	0.969^0	
2291	$C_7H_{12}O_2$	Pimelic aldehyde $OCH(CH_2)_5CHO$	128.09		112^{13}		
2292	$C_7H_{12}O_2$	Teracrylic acid	128.09	< -18	218		
2293	$C_7H_{12}O_2$	Hexahydrobenzoic acid	128.09	31	233	1.048	1040
2294	$C_7H_{12}O_2$	1, 2-Isoheptenic acid	128.09	16.5	227	0.942	442
2295	$C_7H_{12}O_2$	Allyl butyrate $C_3H_7CO_2CH_2CH{:}CH_2$	128.09		143		
2296	$C_7H_{12}O_2$	Allyl isobutyrate	128.09		133.5		
2297	$C_7H_{12}O_2$	Cyclohexyl formate $HCO_2C_6H_{11}$	128.09	<0	162.5	1.010^0	
2298	$C_7H_{12}O_2$	Ethyl angelate	128.09		142	0.918	963
2299	$C_7H_{12}O_2$	Ethyl tiglate $CH_3CH.C(CH_3)CO_2C_2H_5$	128.09		152	0.924	964
2300	$C_7H_{12}O_3$	Hexahydrosalicylic acid	144.09	111			
2301	$C_7H_{12}O_3$	Ethyl levulinate.	144.09		205.3	1.017^{16}_4	263
2302	$C_7H_{12}O_3$	Ethyl methylacetoacetate	144.09		186.8	1.019	239
2303	$C_7H_{12}O_3$	Methyl dimethylacetoacetate	144.09		174	0.999^{25}_{25}	
2304	$C_7H_{12}O_4$	Butylmalonic acid $C_4H_9CH(CO_2H)_2$	160.09	101.5	150 d.		
2305	$C_7H_{12}O_4$	Isobutylmalonic acid.	160.09	107			
2306	$C_7H_{12}O_4$	*sec.*-Butylmalonic acid	160.09	76			
2307	$C_7H_{12}O_4$	Diethylmalonic acid $(C_2H_5)_2C(CO_2H)_2$	160.09	121			
2308	$C_7H_{12}O_4$	*n*-Pimelic acid $HO_2C(CH_2)_5CO_2H$	160.09	103	272^{100}		
2308.1	$C_7H_{12}O_4$	Trimethylsuccinic acid	160.09	152		1.242	
2309	$C_7H_{12}O_4$	Diethyl malonate $CH_2(CO_2C_2H_5)_2$	160.09	-49.9	198.9	1.054	208
2310	$C_7H_{12}O_4$	Dimethyl pyrotartrate	160.09		198	1.078	
2311	$C_7H_{12}O_4$	Methyl ethyl succinate	160.09	< -20	208.2	1.093^0	
2312	$C_7H_{12}O_5$	Glycerol diacetate (Diacetin)	176.09		176^{40}	1.178^{15}_{15}	
2313	$C_7H_{12}O_6$	Quinic acid	192.09	163	d.	1.637	1333
2314	$C_7H_{12}O_6$	Diethyl mesoxalate	192.09	57	200		
2315	$C_7H_{13}BrN_2O_2$	Adalin $CH_2BrCONHCON(C_2H_5)_2$	237.03	116			
2316	$C_7H_{13}BrO_2$	Ethyl 1-bromo-*n*-valerate	209.02		192	1.226^{18}_4	
2317	$C_7H_{13}BrO_2$	Ethyl 1-bromoisovalerate	209.02		186	1.278^{12}_{12}	
2318	$C_7H_{13}ClO_2$	Amyl chloroacetate $ClCH_2CO_2C_5H_{11}$.	164.56		192	1.055	345
2319	$C_7H_{13}ClO_2$	Isoamyl chloroacetate	164.56		192	1.041^{25}_{25}	
2320	$C_7H_{13}N$	Heptylnitrile $C_6H_{13}CN$	111.11		183	0.815	240
2321	$C_7H_{13}NO$	Nortropanol	127.11	161			
2322	$C_7H_{13}NO$	Suberoxime $(CH_2CH_2CH_2)_2C.NOH$.	127.11	23	230	1.023	
2323	$C_7H_{13}NO_2$	Stachydrine	143.11	210			
2324	$C_7H_{13}NO_5$	Quinic amide $(OH)_4C_6H_7CONH_2$	191.11	132			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2325	C_7H_{14}	2, 4-Dimethyl-2-pentene	98.108		84	0.699^{25}	
2326	C_7H_{14}	3-Ethyl-2-pentene $(C_2H_5)_2C{:}CHCH_3$	98.108		98	0.725_4^{15}	192
2327	C_7H_{14}	Heptamethylene (Cycloheptane)	98.108	−12	118.1	0.811	405
2328	C_7H_{14}	Hexahydrotoluene	98.108	−147.5	103	0.764	910
2329	C_7H_{14}	2-Heptene $CH_3CH{:}CHC_4H_9$	98.108		98.5		
2330	C_7H_{14}	Methylcyclohexane	98.108	−126.4	100.8	0.764	272
2331	C_7H_{14}	3-Methyl-2(3)-hexene	98.108		97.4	0.718	186
2332	C_7H_{14}	1-Heptene $C_5H_{11}CH.CH_2$	98.108		99		
2333	C_7H_{14}	2, 2, 3-Trimethyl-1-butene	98.108		80		
2334	C_7H_{14}	2, 3-Dimethyl-2-pentene	98.108		95.1	0.719	
2335	$C_7H_{14}O$	Cycloheptanol	114.11		185.2	0.958	
2336	$C_7H_{14}O$	2-Heptene-4-ol	114.11		63^{11}	$0.842_4^{14.4}$	838
2337	$C_7H_{14}O$	Hexahydrobenzyl alcohol	114.11		181.2	0.916	816
2338	$C_7H_{14}O$	1-Methylcyclohexane-1-ol	114.11	26	168.3	0.919_4^{26}	1029
2339	$C_7H_{14}O$	*o*-Hexahydrocresol	114.11		169	0.923	478
2340	$C_7H_{14}O$	*m*-Hexahydrocresol	114.11	−47	176	0.914	466
2341	$C_7H_{14}O$	*dl-m*-Hexahydrocresol	114.11		175	0.923	467
2342	$C_7H_{14}O$	*p*-Hexahydrocresol	114.11		174	0.924^{14}	833
2343	$C_7H_{14}O$	Heptaldehyde $C_6H_{13}CHO$	114.11	−45.0	155	0.850	202
2344	$C_7H_{14}O$	Dipropyl ketone $(C_3H_7)_2CO$	114.11	−32.6	143.5	0.821_4^{15}	173
2345	$C_7H_{14}O$	Diisopropyl ketone $[(CH_3)_2CH]_2CO$	114.11		123.7	0.806	
2346	$C_7H_{14}O$	Ethyl *n*-butyl ketone $C_2H_5COC_4H_9$	114.11		148.5		
2347	$C_7H_{14}O$	Ethyl isobutyl ketone	114.11		136	0.815	
2348	$C_7H_{14}O$	Methyl *n*-amyl ketone $CH_3COC_5H_{11}$	114.11		150	0.822^{16}	
2349	$C_7H_{14}O$	Methyl isoamyl ketone	114.11		144	0.821^{17}	
2350	$C_7H_{14}O_2$	Isoamylacetic acid	130.11		216.5	0.926^{15}	
2351	$C_7H_{14}O_2$	Heptylic acid $C_6H_{13}CO_2H$	130.11	−10	223.5	0.922	269
2353	$C_7H_{14}O_2$	*n*-Amyl acetate $CH_3CO_2C_5H_{11}$	130.11		147.6	0.879_{20}^{20}	130
2354	$C_7H_{14}O_2$	Isoamyl acetate	130.11		142.5	0.875	122
2354.1	$C_7H_{14}O_2$	*d-β*-Amyl acetate	130.11		131	0.868	100
2355	$C_7H_{14}O_2$	*tert.*-Amyl acetate	130.11		124.8	0.874^{19}	
2356	$C_7H_{14}O_2$	Ethyl *n*-valerate $C_4H_9CO_2C_2H_5$	130.11		145.5	0.877	1109
2357	$C_7H_{14}O_2$	Ethyl isovalerate	130.11	−99.3	135	0.866	126
2358	$C_7H_{14}O_2$	*n*-Hexyl formate $HCO_2C_6H_{13}$	130.11		153.6	0.898^0	
2359	$C_7H_{14}O_2$	Isobutyl propionate	130.11	−71.4	138	0.869	108
2359.1	$C_7H_{14}O_2$	*d-sec.*-Butyl propionate	130.11		132	0.8657	
2360	$C_7H_{14}O_2$	Methyl *n*-caproate $C_5H_{11}CO_2CH_3$	130.11		149.5	0.904_0^0	
2361	$C_7H_{14}O_2$	Propyl *n*-butyrate $C_3H_7CO_2C_3H_7$	130.11	−95.2	143	0.879^{15}	123
2362	$C_7H_{14}O_2$	Propyl isobutyrate $(CH_3)_2CHCO_2C_3H_7$	130.11		135.4	0.884_4^0	97
2363	$C_7H_{14}O_2$	Isopropyl butyrate $C_3H_7CO_2CH(CH_3)_2$	130.11		128	0.865^{13}	
2364	$C_7H_{14}O_2$	Isopropyl isobutyrate	130.11		120.8	0.869_4^0	
2365	$C_7H_{14}O_3$	Di-*n*-propyl carbonate $CO(OC_3H_7)_2$	146.11		168.2	0.968^{22}	
2366	$C_7H_{14}O_3$	Ethyl butyl carbonate	146.11		169		
2367	$C_7H_{14}O_4$	Glycerol 1-butyrate	162.11		271		
2367.1	$C_7H_{14}O_5$	*l*-Methyl rhamnoside	178.11	109			1227
2368	$C_7H_{14}O_6$	*α*-Methyl galactoside	194.11	112			
2369	$C_7H_{14}O_6$	*β*-Methyl galactoside	194.11	176			
2370	$C_7H_{14}O_6$	*α*-Methyl glucose	194.11	161			
2371	$C_7H_{14}O_6$	*β*-Methyl glucose	194.11	135			
2372	$C_7H_{14}O_6$	*α*-Methyl glucoside	194.11	168	$200^{0.2}$		1230
2373	$C_7H_{14}O_6$	*β*-Methyl glucoside	194.11	104			1171
2373.1	$C_7H_{14}O_6$	*α*-Methyl mannoside	194.11	194			1217
2374	$C_7H_{14}O_6$	*d*-Inosite methyl ether (*β*-Pinite)	194.11	187		1.52	
2375	$C_7H_{14}O_6$	*l*-Inosite methyl ether (Quebrachite)	194.11	191	210^{vac}	1.54	
2376	$C_7H_{14}O_7$	*d, β*-Galaheptose	210.11	199			
2377	$C_7H_{14}O_7$	*d, α*-Glucoheptose	210.11	215 d.			
2378	$C_7H_{14}O_8$	*d*-Mannoheptonic acid	226.11	175 d.			
2379	$C_7H_{14}S$	*m*-Hexahydrothiocresol	130.17		174		
2380	$C_7H_{15}Br$	*n*-Heptyl bromide $C_7H_{15}Br$	179.03		178.8	1.133^{16}	
2381	$C_7H_{15}Cl$	*n*-Heptyl chloride $C_7H_{15}Cl$	134.57		159.5	0.881^{16}	
2382	$C_7H_{15}F$	*n*-Heptyl fluoride $C_7H_{15}F$	118.12	−73	119.2	0.804	61
2383	$C_7H_{15}I$	*n*-Heptyl iodide $C_7H_{15}I$	226.05		203.8	1.401^0	469
2384	$C_7H_{15}N$	Ethylpiperidine	113.12		128	0.857_4^{23}	1000

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2385	$C_7H_{15}NO$	*n*-Heptylamide $C_6H_{13}CONH_2$	129.12	96			
2386	$C_7H_{15}NO$	Heptaldoxime $C_6H_{13}CH{:}NOH$	129.12	55.5	195	0.834^{22}_{4}	**1124**
2386.1	$C_7H_{15}NO_2$	Isobutylurethane $C_4H_9NHCO_2C_2H_5$	145.12	< −65	96^{17}	0.943	**311**
2387	C_7H_{16}	2, 4-Dimethylpentane $CH_2[CH(CH_3)_2]_2$	100.12		83.9	0.681	**45**
2388	C_7H_{16}	3, 3-Dimethylpentane	100.12		87	0.711^0	
2389	C_7H_{16}	*n*-Heptane $CH_3(CH_2)_5CH_3$	100.12	−90.0	98.4	0.684	**55**
2390	C_7H_{16}	2-Methylhexane $(CH_3)_2CHC_4H_9$	100.12		90.4	0.707^0_4	
2391	C_7H_{16}	*d*, 3-Methylhexane $C_3H_7CH(CH_3)C_2H_5$	100.12		92	0.687	
2392	C_7H_{16}	3-Ethylpentane $(C_2H_5)_3CH$	100.12		93.8	0.670	**89**
2393	C_7H_{16}	2, 2, 3-Trimethylbutane	100.12	−25	80.8	0.695^{15}_4	**77**
2394	C_7H_{16}	2, 2-Dimethylpentane $(CH_3)_3CC_3H_7$	100.12		78.6	0.674	
2396	$C_7H_{16}O$	Dimethylbutyl carbinol	116.12		142.2	0.816	**224**
2397	$C_7H_{16}O$	Dimethylisobutyl carbinol	116.12		130	0.816	**228**
2398	$C_7H_{16}O$	Dimethyl-*tert.*-butyl carbinol	116.12	17	132		
2399	$C_7H_{16}O$	Dipropyl carbinol $(C_3H_7)_2CHOH$	116.12		155.1	0.820	**256**
2400	$C_7H_{16}O$	Diisopropyl carbinol	116.12		140	0.820	**265**
2400.1	$C_7H_{16}O$	*d*-Ethylbutyl carbinol	116.12		66^{18}	0.823	**251**
2401	$C_7H_{16}O$	Ethylisobutyl carbinol.	116.12		148.2		
2402	$C_7H_{16}O$	Ethyl-*sec.*-butyl carbinol	116.12		150	0.852^0	
2403	$C_7H_{16}O$	*n*-Heptyl alcohol $C_7H_{15}OH$	116.12	−34.6	175.8	0.817^{22}	**287**
2404	$C_7H_{16}O$	2-Hydroxy-3-ethylpentane	116.12		152	0.853^0	
2405	$C_7H_{16}O$	1-Hydroxy-2-methylhexane	116.12		162.5	0.831^{13}_4	**266**
2406	$C_7H_{16}O$	Isoheptyl alcohol	116.12		167.2	0.831^0	**291**
2407	$C_7H_{16}O$	Methyl-*n*-amyl carbinol	116.12		158	0.819	**259**
2407.1	$C_7H_{16}O$	*d*-Methylamyl carbinol	116.12		73.5^{20}	0.819	**253**
2408	$C_7H_{16}O$	Methylisoamyl carbinol	116.12		150	$0.819^{17.5}$	
2409	$C_7H_{16}O$	Methylethylpropyl carbinol	116.12		141	0.823	**270**
2410	$C_7H_{16}O$	Methylethylisopropyl carbinol	116.12		140	0.833	
2411	$C_7H_{16}O$	Propylisopropyl carbinol	116.12		141	0.821^{17}	**215**
2412	$C_7H_{16}O$	Triethyl carbinol $(C_2H_5)_3COH$	116.12		142	0.840	**334**
2413	$C_7H_{16}O$	Ethyl isoamyl ether	116.12		112	0.764^{18}	
2414	$C_7H_{16}O$	Propyl butyl ether $C_4H_9OC_3H_7$	116.12		117.1	0.777^0	
2415	$C_7H_{16}O_3$	Ethyl orthoformate $HC(OC_2H_5)_3$.	148.12	−76.1	145.9	0.897	
2416	$C_7H_{16}O_4S_2$	Sulfonal $(CH_3)_2C(SO_2C_2H_5)_2$.	228.25	128	300 d.		
2417	$C_7H_{16}O_7$	*d*-Mannoheptitol	212.12	188			
2418	$C_7H_{16}O_7$	Volemitol	212.12	155			
2419	$C_7H_{17}N$	*n*-Heptylamine $C_7H_{15}NH_2$	115.14	−23.0	155.1	0.777	**278**
2420	$C_8Cl_4O_3$	Tetrachloro-*o*-phthalic anhydride	285.83	257			
2421	$C_8H_2Cl_2O_3$	3, 6-Dichloro-*o*-phthalic anhydride	216.93	191	339		
2422	$C_8H_2Cl_4O_4$	Tetrachloro-*o*-phthalic acid	303.85	250			
2422.1	$C_8H_4BrNO_2$	*m*-Bromoisatine.	225.96	255			
2422.2	C_8H_4ClNO	Isatine chloride.	165.50	180 d.			
2423	$C_8H_4Cl_2O_2$	*o*-Phthalyl dichloride *o*-$C_6H_4(COCl)_2$	202.95	0	276.7	1.408	**755**
2424	$C_8H_4Cl_2O_2$	Isophthalyl dichloride *m*-$C_6H_4(COCl)_2$.	202.95	41	276		
2425	$C_8H_4Cl_2O_2$	Terephthalyl dichloride *p*-$C_6H_4(COCl)_2$.	202.95	78	259		
2426	$C_8H_4Cl_2O_4$	3, 6-Dichloro-*o*-phthalic acid	234.95	185			
2427	$C_8H_4Cl_4O$	Trichloromethyl *p*-chlorophenylketone	257.86	28	181^{45}		
2428	$C_8H_4N_2$	Isophthalic nitrile *m*-$C_6H_4(CN)_2$	128.05	161			
2429	$C_8H_4N_2$	Terephthalic nitrile *p*-$C_6H_4(CN)_2$	128.05	222			
2430	$C_8H_4N_2O_4$	Nitroisatine	192.05	230			
2431	$C_8H_4O_3$	*o*-Phthalic anhydride	148.03	130.8	284.5	1.527^4	
2432	$C_8H_5Cl_3O$	Dichloromethyl *p*-chlorophenyl ketone	223.41	51	178^{45}		
2433	$C_8H_5Cl_4NO$	2, 3, 4, 6-Tetrachloroacetanilide	272.88	181			
2434	C_8H_5NO	Benzoyl cyanide $C_6H_5.COCN$	131.05	34	208		
2435	$C_8H_5NO_2$	*o*-Cyanobenzoic acid	147.05	190			
2436	$C_8H_5NO_2$	*m*-Cyanobenzoic acid	147.05	217			
2437	$C_8H_5NO_2$	*p*-Cyanobenzoic acid	147.05	214			
2438	$C_8H_5NO_2$	Isatine	147.05	201			
2439	$C_8H_5NO_2$	*o*-Phthalimide *o*-$C_6H_4(CO)_2NH$	147.05	238			
2440	$C_8H_5NO_6$	3-Nitro-*o*-phthalic acid	211.05	220			
2441	$C_8H_5NO_6$	4-Nitro-*o*-phthalic acid	211.05	164			
2442	$C_8H_5NO_6$	2-Nitroisophthalic acid	211.05	300			
2443	$C_8H_5NO_6$	4-Nitroisophthalic acid	211.05	245			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
2444	$C_8H_5NO_6$	5-Nitroisophthalic acid	211.05	255			
2445	$C_8H_5NO_6$	2-Nitroterephthalic acid	211.05	270			
2446	$C_8H_5NO_6$	Pyridine-2, 3, 4-tricarboxylic acid	211.05	250 d.			
2447	$C_8H_5NO_6$	Pyridine 2, 3, 5-tricarboxylic acid	211.05	323			
2448	$C_8H_5NO_6$	Pyridine-2, 3, 6-tricarboxylic acid	211.05	100			
2449	$C_8H_5NO_6$	Pyridine-2, 4, 5-tricarboxylic acid	211.05	235			
2450	$C_8H_5NO_6$	Pyridine-2, 4, 6-tricarboxylic acid	211.05	227			
2451	$C_8H_5NO_6$	Pyridine-3, 4, 5-tricarboxylic acid	211.05	261			
2452	$C_8H_5N_3O_8$	Picryl acetate	271.06	76	120 d.		
2453	C_8H_6	Phenylacetylene $C_6H_5C{:}CH$	102.05		143	0.930	820
2454	C_8H_6BrN	Bromobenzyl cyanide $C_6H_5CHBrCN$	195.97	> −17	231.7	1.519	1185
2455	$C_8H_6Br_2$	Styrene-1, 2-dibromide	261.88	73.5	134^{15}		
2456	$C_8H_6Br_2O$	*p*-Bromophenacyl bromide	277.88	109.7			
2457	$C_8H_6Cl_2O_2$	Piperonal chloride	204.96		240 s. d.		
2458	$C_8H_6Cl_3NO$	2, 3, 4-Trichloroacetanilide	238.43	122			
2459	$C_8H_6Cl_3NO$	2, 4, 5-Trichloroacetanilide	238.43	190			
2460	$C_8H_6Cl_3NO$	2, 4, 6-Trichloroacetanilide	238.43	204			
2461	$C_8H_6I_2O_3$	Methyl 3, 5-diiodosalicylate	403.91	110.5			
2462	$C_8H_6N_2$	Phthalazine	130.06	91	317		
2463	$C_8H_6N_2$	Quinazoline	130.06	48	243		
2464	$C_8H_6N_2$	Quinoxaline	130.06	30.5	226	1.133_4^{48}	1075
2465	$C_8H_6N_2O_2$	Isatoxime (Nitrosooxindol)	162.06	202			
2466	$C_8H_6N_2O_2$	*p*-Nitrobenzyl cyanide	162.06	117			
2467	$C_8H_6N_4O_8$	Alloxantin	286.08	170 d.			
2468	C_8H_6O	Coumarone	118.05	> −18	175	1.091	997
2469	$C_8H_6O_2$	Phenylglyoxal $C_6H_5CO.CHO$	134.05	73	142^{125}		
2470	$C_8H_6O_2$	*o*-Phthalic aldehyde *o*-$C_6H_4(CHO)_2$	134.05	56			
2471	$C_8H_6O_2$	Isophthalic aldehyde *m*-$C_6H_4(CHO)_2$	134.05	89.5			
2472	$C_8H_6O_2$	Terephthalic aldehyde *p*-$C_6H_4(CHO)_2$	134.05	116	248		
2473	$C_8H_6O_2$	Phthalide	134.05	73; 65	290		
2474	$C_8H_6O_3$	Piperonal (Heliotropin)	150.05	37	263		
2475	$C_8H_6O_3$	*o*-Aldehydobenzoic acid	150.05	100.5		1.404	
2476	$C_8H_6O_3$	*m*-Aldehydobenzoic acid	150.05	175			
2477	$C_8H_6O_3$	*p*-Aldehydobenzoic acid	150.05	250			
2478	$C_8H_6O_3$	Phenylglyoxylic acid	150.05	66	148^{6}		
2479	$C_8H_6O_4$	*o*-Phthalic acid *o*-$C_6H_4(CO_2H)_2$	166.05	191 d.		1.593	
2480	$C_8H_6O_4$	Isophthalic acid *m*-$C_6H_4(CO_2H)_2$	166.05	330			
2482	$C_8H_6O_4$	Piperonylic acid $CH_2{:}O_2{:}C_6H_3.CO_2H$	166.05	228			
2483	$C_8H_6O_5$	2-Hydroxy-*o*-phthalic acid	182.05	244			
2485	$C_8H_6O_5$	4-Hydroxy-*o*-phthalic acid	182.05	181 d.			
2486	$C_8H_6O_5$	2-Hydroxyisophthalic acid	182.05	239			
2487	$C_8H_6O_5$	4-Hydroxyisophthalic acid	182.05	306			
2488	$C_8H_6O_5$	5-Hydroxyisophthalic acid	182.05	288			
2489	$C_8H_6O_5$	Noropianic acid	182.05	171			
2490	C_8H_6S	Thionaphthene	134.11	32	221	1.165	1049
2491	C_8H_7Br	α-Bromostyrene $C_6H_5CBr{:}CH_2$	182.97	−43.5	160^{75}	1.4057	770
2492	C_8H_7Br	ω-Bromostyrene (isomer 1)	182.97	7	221	1.4224	786
2493	C_8H_7Br	ω-Bromostyrene (isomer 2)	182.97	−7.5	108^{26}	1.427	992
2493.1	$C_8H_7BrN_2O_3$	α-Bromonitroacetanilide	258.99	131		1.765	
2494	C_8H_7BrO	ω-Bromoacetophenone	198.97	50	119	1.647	
2495	C_8H_7Cl	α-Chlorostyrene $C_6H_5C.Cl\,CH_2$	138.51		199		
2496	C_8H_7Cl	ω-Chlorostyrene $C_6H_5CH.CHCl$	138.51		198.8	1.112^{23}	
2497	C_8H_7ClO	ω-Chloroacetophenone	154.51	59	247	1.324^{15}	
2498	C_8H_7ClO	*p*-Chloroacetophenone	154.51	20	232	1.188	
2499	C_8H_7ClO	Phenylacetyl chloride $C_6H_5CH_2COCl$	154.51		102.5^{17}	1.168	
2500	$C_8H_7ClO_2$	*p*-Anisyl chloride *p*-$CH_3OC_6H_4COCl$	170.51	27			
2501	$C_8H_7ClO_2$	Phenyl chloroacetate $ClCH_2CO_2C_6H_5$	170.51	45	235		
2502	$C_8H_7F_2NO$	2, 5-Difluoroacetanilide	171.06	122.5			
2503	C_8H_7N	Benzyl cyanide $C_6H_5CH_2CN$	117.06	−23.8	233.9	1.015^{18}	679
2504	C_8H_7N	Indole	117.06	52.5	254		1333
2505	C_8H_7N	*o*-Tolunitrile *o*-$CH_3C_6H_4CN$	117.06		204	0.995_{25}^{25}	1004
2506	C_8H_7N	*m*-Tolunitrile *m*-$CH_3C_6H_4CN$	117.06		214	0.984_{25}^{25}	
2507	C_8H_7N	*p*-Tolunitrile *p*-$CH_3C_6H_4CN$	117.06	29.5	217		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
2508	C_8H_7NO	*p*-Anisonitrile *p*-$CH_3OC_6H_4CN$.	133.06	60	256		
2509	C_8H_7NO	*dl*-Mandelonitrile $C_6H_5CH(OH)CN$.	133.06	−10	d.	1.124	
2510	C_8H_7NO	Indoxyl.................... .	133.06	85	110		
2511	C_8H_7NO	Oxindol....................... .	133.06	120			
2512	$C_8H_7NO_2$	Hydrindic acid (Dioxindol) .	149.06	180	195 d.		
2513	$C_8H_7NO_2$	*o*-Nitrostyrene *o*-$NO_2.C_6H_4.CH:CH_2$	149.06	13.5			
2514	$C_8H_7NO_2$	*m*-Nitrostyrene *m*-$NO_2.C_6H_4.CH:CH_2$	149.06	−5			
2515	$C_8H_7NO_2$	*p*-Nitrostyrene *p*-$NO_2.C_6H_4.CH:CH_2$	149.06	29			
2516	$C_8H_7NO_3$	Oxanilic acid $CO_2H.CONHC_6H_5$	165.06	150			
2517	$C_8H_7NO_3$	*o*-Phthalamic acid .	165.06	149	155 d.		
2518	$C_8H_7NO_4$	Methyl *o*-nitrobenzoate	181.06	−8	269	1.284_{25}^{25}	
2519	$C_8H_7NO_4$	Methyl *m*-nitrobenzoate	181.06	70	279		
2520	$C_8H_7NO_4$	Methyl *p*-nitrobenzoate	181.06	96			
2521	$C_8H_7NO_4$	Uvitonic acid .. .	181.06	274			
2522	C_8H_7NS	Benzyl isothiocyanate	149.13		243		
2522.1	C_8H_7NS	Benzyl thiocyanate	149.13	41	235		
2523	C_8H_7NS	*o*-Tolyl isothiocyanate	149.13		239	1.104_{25}^{25}	
2524	C_8H_7NS	*m*-Tolyl isothiocyanate	149.13		245		
2525	C_8H_7NS	*p*-Tolyl isothiocyanate	149.13	26	237	1.087_{25}^{25}	
2526	$C_8H_7N_3O_5$	2, 3-Dinitroacetanilide	225.08	186			
2527	$C_8H_7N_3O_5$	2, 4-Dinitroacetanilide	225.08	120			
2528	$C_8H_7N_3O_5$	2, 6-Dinitroacetanilide	225.08	197			
2529	$C_8H_7N_3O_5$	3, 4-Dinitroacetanilide	225.08	144			
2530	$C_8H_7N_3O_5$	3, 6-Dinitroacetanilide	225.08	121			
2531	$C_8H_7N_3O_6$	3, 4, 5-Trinitro-*o*-xylene	241.08	115			
2532	$C_8H_7N_3O_6$	3, 4, 6-Trinitro-*o*-xylene	241.08	72			
2533	$C_8H_7N_3O_6$	2, 4, 5-Trinitro-*m*-xylene	241.08	90			
2534	$C_8H_7N_3O_6$	2, 4, 6-Trinitro-*m*-xylene	241.08	181.5			
2535	$C_8H_7N_3O_6$	4, 5, 6-Trinitro-*m*-xylene	241.08	125			
2536	$C_8H_7N_3O_6$	2, 3, 6-Trinitro-*p*-xylene	241.08	140^{20}			
2537	$C_8H_7N_3O_7$	Ethyl picrate	257.08	78.5			
2538	C_8H_8	Styrene (Phenylethylene)	104.06		146	0.903	907
2539	C_8H_8BrNO	*o*-Bromoacetanilide	213.99	99			
2540	C_8H_8BrNO	*p*-Bromoacetanilide.. .	213.99	165			
2540.1	$C_8H_8Br_2$	*o*-Xylenedibromide *o*-$C_6H_4(CH_2Br)_2$	263.89	94.5	d.	1.988	
2540.2	$C_8H_8Br_2$	*m*-Xylenedibromide *m*-$C_6H_4(CH_2Br)_2$	263.89	77	140	1.959	
2541	$C_8H_8Br_2$	*p*-Xylenedibromide *p*-$C_6H_4(CH_2Br)_2$	263.89	144	245	2.102^0	
2542	C_8H_8ClNO	*o*-Chloroacetanilide..............	169.53	88			
2543	C_8H_8ClNO	*m*-Chloroacetanilide . . .	169.53	72.5			
2544	C_8H_8ClNO	*p*-Chloroacetanilide .	169.53	172.5			
2544.1	$C_8H_8Cl_2$	*o*-Xylenedichloride *o*-$C_6H_4(CH_2Cl)_2$	174.98	55	241	1.393	
2544.2	$C_8H_8Cl_2$	*m*-Xylenedichloride *m*-$C_6H_4(CH_2Cl)_2$	174.98	34.2	255	1.302	
2545	$C_8H_8Cl_2$	*p*-Xylenedichloride *p*-$C_6H_4(CH_2Cl)_2$	174.98	100.5	120^{20}	1.417^0	
2546	C_8H_8INO	*p*-Iodoacetanilide *p*-$CH_3CONHC_6H_4I$	261.00	184			
2547	$C_8H_8N_2$	Apoharmine............... ...	132.08	183			
2548	$C_8H_8N_2$	1-Methylindazole...........	132.08		107^{15}	$1.032_4^{99.2}$	1129
2549	$C_8H_8N_2OS$	Benzoylthiourea $C_6H_5CONHCSNH_2$	180.14	169			
2550	$C_8H_8N_2O_2$	Benzoylurea $C_6H_5CONHCONH_2$	164.08	200			
2551	$C_8H_8N_2O_2$	*o*-Phthalic diamide *o*-$C_6H_4(CONH_2)_2$	164.08	220			
2552	$C_8H_8N_2O_2$	Isophthalic diamide *m*-$C_6H_4(CONH_2)_2$	164.08	265			
2553	$C_8H_8N_2O_2$	*N*-Nitrosoacetanilide	164.08	41			
2554	$C_8H_8N_2O_2$	Ricinine	164.08	201			
2555	$C_8H_8N_2O_3$	*o*-Nitroacetanilide...	180.08	93			
2556	$C_8H_8N_2O_3$	*m*-Nitroacetanilide.. .	180.08	150.5			
2557	$C_8H_8N_2O_3$	*p*-Nitroacetanilide. .	180.08	214			
2558	$C_8H_8N_2O_4$	3, 4-Dinitro-*o*-xylene.	196.08	82			
2559	$C_8H_8N_2O_4$	3, 6-Dinitro-*o*-xylene	196.08	56			
2560	$C_8H_8N_2O_4$	4, 5-Dinitro-*o*-xylene	196.08	115			
2561	$C_8H_8N_2O_4$	4, 6-Dinitro-*o*-xylene .	196.08	75			
2562	$C_8H_8N_2O_4$	2, 5-Dinitro-*m*-xylene	196.08	101			
2563	$C_8H_8N_2O_4$	4, 5-Dinitro-*m*-xylene	196.08	132			
2564	$C_8H_8N_2O_4$	2, 3-Dinitro-*p*-xylene	196.08	93			
2565	$C_8H_8N_2O_4$	2, 5-Dinitro-*p*-xylene..................	196.08	147			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2566	$C_8H_8N_2O_4$	2, 6-Dinitro-*p*-xylene	196.08	124			
2566 1	$C_8H_8N_2O_6$	4, 5-Dinitro-1, 2-dimethoxybenzene	228.08	130.5		1.326^{131}	
2566 2	$C_8H_8N_4O$	4-Methoxyphenyltetrazole	128.09	228			1306
2567	C_8H_8O	Phenylacetaldehyde $C_6H_5CH_2CHO$	120.06		194	1.027	
2568	C_8H_8O	*o*-Toluic aldehyde *o*-$CH_3C_6H_4CHO$	120.06		195.5	1.039	960
2569	C_8H_8O	*m*-Toluic aldehyde *m*-$CH_3C_6H_4CHO$	120.06		195.5	1.019	971
2570	C_8H_8O	*p*-Toluic aldehyde *p*-$CH_3C_6H_4CHO$	120.06		204	1.020	814; 906
2571	C_8H_8O	Acetophenone $CH_3COC_6H_5$	120.06	19.7	202.3	1.026	705
2572	C_8H_8O	Coumarane	120.06		189.5	1.074	
2573	$C_8H_8O_2$	Phenacyl alcohol $C_6H_5COCH_2OH$	136.06	86		1.013	
2574	$C_8H_8O_2$	5-Hydroxytoluene-2-aldehyde	136.06	108.9			
2575	$C_8H_8O_2$	4-Hydroxytoluene-3-aldehyde	136.06	55.1	21.8		
2576	$C_8H_8O_2$	6-Hydroxytoluene-3-aldehyde	136.06	117.4			
2577	$C_8H_8O_2$	3-Hydroxytoluene-4-aldehyde	136.06	54	223		
2578	$C_8H_8O_2$	*o*-Methoxybenzaldehyde	136.06	35	242	1.133	745
2579	$C_8H_8O_2$	*m*-Methoxybenzaldehyde	136.06		230	1.118	836
2580	$C_8H_8O_2$	*p*-Methoxybenzaldehyde	136.06	2.5	247	1.123	821
2581	$C_8H_8O_2$	*o*-Hydroxyacetophenone	136.06		213		
2582	$C_8H_8O_2$	*m*-Hydroxyacetophenone	136.06	95			
2583	$C_8H_8O_2$	*p*-Hydroxyacetophenone	136.06	109			
2584	$C_8H_8O_2$	Phenylacetic acid $C_6H_5CH_2CO_2H$	136.06	76.7	265.5	1.078^{83}	
2585	$C_8H_8O_2$	*o*-Toluic acid *o*-$CH_3C_6H_4CO_2H$	136.06	102.4	259.2	$1.062_4^{114.6}$	1157
2586	$C_8H_8O_2$	*m*-Toluic acid *m*-$CH_3C_6H_4CO_2H$	136.06	110.5	263	$1.054_4^{111.6}$	640
2587	$C_8H_8O_2$	*p*-Toluic acid *p*-$CH_3C_6H_4CO_2H$	136.06	176.8	275		
2588	$C_8H_8O_2$	Benzyl formate $HCO_2CH_2C_6H_5$	136.06		203.4	1.081	
2589	$C_8H_8O_2$	Methyl benzoate $C_6H_5CO_2CH_3$	136.06	−12.5	199.6	1.094	656
2590	$C_8H_8O_2$	Phenyl acetate $CH_3CO_2C_6H_5$	136.06		195.5	1.078	610
2591	$C_8H_8O_2$	*o*-Xyloquinone 1, 2-$(CH_3)_2C_6H_2O_2$-3, 6.	136.06	55			
2592	$C_8H_8O_2$	*m*-Xyloquinone 1, 3-$(CH_3)_2C_6H_2O_2$-2, 5.	136.06	73			
2593	$C_8H_8O_2$	*p*-Xyloquinone 1, 4-$(CH_3)_2.C_6H_2O_2$-2, 5.	136.06	125			
2594	$C_8H_8O_3$	Piperonyl alcohol	152.06	51			
2595	$C_8H_8O_3$	Isovanillin 4, 3-$CH_3OC_6H_3(OH)CHO$.	152.06	116		1.196	
2596	$C_8H_8O_3$	Vanillin 3, 4-$CH_3OC_6H_3(OH)CHO$	152.06	81	285		
2597	$C_8H_8O_3$	*o*-Hydroxymethylbenzoic acid.	152.06	120			
2598	$C_8H_8O_3$	*m*-Hydroxymethylbenzoic acid	152.06	111	190^{11}		
2599	$C_8H_8O_3$	*p*-Hydroxymethylbenzoic acid	152.06	181			
2600	$C_8H_8O_3$	*o*-Hydroxyphenylacetic acid	152.06	137			
2601	$C_8H_8O_3$	*m*-Hydroxyphenylacetic acid	152.06	129			
2602	$C_8H_8O_3$	*p*-Hydroxyphenylacetic acid	152.06	148			
2603	$C_8H_8O_3$	3-Hydroxytoluene-2-carboxylic acid.	152.06	167			
2604	$C_8H_8O_3$	4-Hydroxytoluene-2-carboxylic acid.	152.06	172.4			
2605	$C_8H_8O_3$	5-Hydroxytoluene-2-carboxylic acid	152.06	178			
2606	$C_8H_8O_3$	6-Hydroxytoluene-2-carboxylic acid	152.06	183			
2607	$C_8H_8O_3$	4-Hydroxytoluene-3-carboxylic acid.	152.06	152.5			
2608	$C_8H_8O_3$	5-Hydroxytoluene-3-carboxylic acid.	152.06	208			
2609	$C_8H_8O_3$	6-Hydroxytoluene-3-carboxylic acid	152.06	172			
2610	$C_8H_8O_3$	2-Hydroxytoluene-4-carboxylic acid.	152.06	207			
2611	$C_8H_8O_3$	3-Hydroxytoluene-4-carboxylic acid.	152.06	177.8			
2612	$C_8H_8O_3$	*d*(*l*)-Mandelic acid $C_6H_5CH(OH)CO_2H$.	152.06	133			
2613	$C_8H_8O_3$	*dl*-Mandelic acid $C_6H_5CH(OH)CO_2H$	152.06	118		1.361^4	
2614	$C_8H_8O_3$	*o*-Methoxybenzoic acid	152.06	98	200		
2615	$C_8H_8O_3$	*m*-Methoxybenzoic acid	152.06	100			
2616	$C_8H_8O_3$	*p*-Methyoxybenzoic acid	152.06	184.2	280	1.385^4	1333
2617	$C_8H_8O_3$	Phenoxyacetic acid $C_6H_5OCH_2CO_2H$	152.06	99	285 s. d.		
2618	$C_8H_8O_3$	Methyl salicylate $HOC_6H_4CO_2CH_3$	152.06	−8.6	223.3	1.184	708
2619	$C_8H_8O_3$	Resorcinol acetate	152.06		283		
2620	$C_8H_8O_4$	Phloroacetophenone	168.06	285			
2621	$C_8H_8O_4$	Berberonic acid 2, 4, 5-$C_5H_2N(CO_2H)_3$	168.06	165			
2622	$C_8H_8O_4$	Dehydracetic acid	168.06	109	270		
2623	$C_8H_8O_4$	$\Delta^{1,4}$-Dihydro-*o*-phthalic acid	168.06	153			
2624	$C_8H_8O_4$	$\Delta^{2,4}$-Dihydro-*o*-phthalic acid	168.06	215			
2625	$C_8H_8O_4$	$\Delta^{2,6}$-Dihydro-*o*-phthalic acid	168.06	215			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2626	$C_8H_8O_4$	Homogentisinic acid	168.06	147			
2627	$C_8H_8O_4$	Isovanillic acid	168.06	250			
2628	$C_8H_8O_4$	Vanillic acid	168.06	207			
2630	$C_8H_8O_5$	Methyl gallate..	184.06	192 d.			
2631	$C_8H_8O_8$	Tetramethylene-1, 1, 2, 2-tetracarboxylic acid..... ...	232.06	203			
2632	C_8H_9Br	*o*-Xylyl bromide	184.99	21	217.7	1.381^{23}	
2633	C_8H_9Br	4-Bromo-*o*-xylene	184.99	0.2	214.5	1.369	740
2634	C_8H_9Br	*m*-Xylyl bromide	184.99		215.8 s. d.	1.371^{23}	
2635	C_8H_9Br	2-Bromo-*m*-xylene	184.99	> −10	206		
2636	C_8H_9Br	4-Bromo-*m*-xylene	184.99		207		
2637	C_8H_9Br	5-Bromo-*m*-xylene	184.99	> −20	204	1.362	
2638	C_8H_9Br	*p*-Xylyl bromide	184.99	38	220.7	1.324	
2639	C_8H_9Br	2-Bromo-*p*-xylene	184.99	10	205.7	1.356	735
2640	C_8H_9Cl	*o*-Xylyl chloride..	140.53		199		
2641	C_8H_9Cl	3-Chloro-*o*-xylene	140.53	> −20	189.5		
2642	C_8H_9Cl	4-Chloro-*o*-xylene.	140.53	> −20	191.5	1.0692^{15}_{15}	
2643	C_8H_9Cl	*m*-Xylyl chloride .	140.53		196		
2644	C_8H_9Cl	*p*-Xylyl chloride...	140.53		202		
2645	C_8H_9N	2-Allylpyridine...	119.08		190	0.959^{0}	
2646	C_8H_9NO	*o*-Aminoacetophenone	135.08		252 s. d.		
2647	C_8H_9NO	*m*-Aminoacetophenone	135.08	96.5	290		
2648	C_8H_9NO	*p*-Aminoacetophenone	135.08	106	295		
2649	C_8H_9NO	Acetanilide (Antifebrin)	135.08	114.2	303.8	1.21^{4}	
2650	C_8H_9NO	Acetophenoneoxime $CH_3C(:NOH)C_6H_5$	135.08	58			
2651	C_8H_9NO	Phenylacetamide $C_6H_5CH_2CONH_2$	135.08	155	284		
2652	C_8H_9NO	*o*-Toluic amide *o*-$CH_3C_6H_4CONH_2$.	135.08	138			
2653	C_8H_9NO	*m*-Toluic amide *m*-$CH_3C_6H_4CONH_2$.	135.08	97			
2654	C_8H_9NO	*p*-Toluic amide *p*-$CH_3C_6H_4CONH_2$.	135.08	159			
2655	$C_8H_9NO_2$	*o*-Acetoaminophenol .	151.08	203			
2656	$C_8H_9NO_2$	*m*-Acetoaminophenol	151.08	149			
2657	$C_8H_9NO_2$	*p*-Acetoaminophenol	151.08	168			
2658	$C_8H_9NO_2$	*dl*-Aminophenylacetic acid. .	151.08	256	265		
2659	$C_8H_9NO_2$	Homoanthranilic acid	151.08	177 d.			
2660	$C_8H_9NO_2$	*N*-Methylanthranilic acid	151.08	179			
2661	$C_8H_9NO_2$	*dl*-Phenylaminoacetic acid .	151.08	127			
2662	$C_8H_9NO_2$	Benzyl carbamate $C_6H_5CH_2CO_2NH_2$.	151.08	86			
2663	$C_8H_9NO_2$	Ethyl nicotinate ...	151.08		105^{5}		
2664	$C_8H_9NO_2$	Methyl *o*-aminobenzoate	151.08	8.2; 24.3	135.5^{15}	1.168^{15}	
2665	$C_8H_9NO_2$	Methyl *p*-aminobenzoate	151.08	112			
2666	$C_8H_9NO_2$	3-Nitro-*o*-xylene	151.08		250.8	1.147^{15}	
2667	$C_8H_9NO_2$	4-Nitro-*o*-xylene.	151.08	30	258	1.139^{30}	
2668	$C_8H_9NO_2$	2-Nitro-*m*-xylene	151.08		225.5	1.112^{15}	
2669	$C_8H_9NO_2$	4-Nitro-*m*-xylene	151.08	2	246	$1.126^{17.5}$	
2670	$C_8H_9NO_2$	5-Nitro-*m*-xylene	151.08	71	273.7		
2671	$C_8H_9NO_2$	2-Nitro-*p*-xylene.	151.08		239.9	1.132^{15}	
2672	$C_8H_9NO_2$	α-Anisaldoxime $CH_3OC_6H_4CH:NOH$	151.08	64			
2673	$C_8H_9NO_2$	β-Anisaldoxime $CH_3OC_6H_4CH{\cdot}NOH$	151.08	133			
2674	$C_8H_9NO_2$	*o*-Methoxybenzamide	151.08	129			
2675	$C_8H_9NO_2$	*p*-Methoxybenzamide	151.08	162.3			
2676	$C_8H_9NO_3$	3-Nitro-4-methoxytoluene.	167.08	8.5	274 d.		
2677	$C_8H_9NO_3$	*o*-Nitrophenetol *o*-$C_2H_5OC_6H_4NO_2$	167.08		268	1.190^{15}	718
2678	$C_8H_9NO_3$	*p*-Nitrophenetol *p*-$C_2H_5OC_6H_4NO_2$	167.08	60	283		
2679	$C_8H_9NO_3$	Methyl 3-hydroxy-4-aminobenzoate.	167.08	120			
2680	$C_8H_9NO_3$	Methyl 3-amino-4-hydroxybenzoate.	167.08	143			
2681	$C_8H_9NO_4$	Biliverdic acid...... . . .	183.08	114			
2682	C_8H_9NS	Thioacetanilide $CH_3CSNHC_6H_5$.	151.14	75	d.		
2682.1	$C_8H_9N_3O_4$	2, 4-Dinitrodimethylaniline	221.09	87		1.476	
2683	C_8H_{10}	Ethylbenzene $C_6H_5CH_2CH_3$	106.08	−92.8	$136.5^{776.7}$	0.868	577
2684	C_8H_{10}	*o*-Xylene *o*-$C_6H_4(CH_3)_2$	106.08	−27.1	144	0.879	626
2685	C_8H_{10}	*m*-Xylene *m*-$C_6H_4(CH_3)_2$	106.08	−53.6	139.0	0.865	584
2686	C_8H_{10}	*p*-Xylene *p*-$C_6H_4(CH_3)_2$.	106.08	13.2	137.7	0.861	573
2687	$C_8H_{10}ClN$	*o*-Chlorodimethylaniline.	155.54		208.5	1.107	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2688	$C_8H_{10}ClN$	*p*-Chlorodimethylaniline.. .	155 54	35.5	231		
2689	$C_8H_{10}N_2O$	*N*-Acetyl-*o*-phenylenediamine	150.09	144.8			
2690	$C_8H_{10}N_2O$	*N*-Acetyl-*m*-phenylenediamine	150.09	279			
2691	$C_8H_{10}N_2O$	*N*-Acetyl-*p*-phenylenediamine	150.09	160.5			
2692	$C_8H_{10}N_2O$	Benzylurea $C_6H_5CH_2NHCONH_2$	150.09	147.5			
2693	$C_8H_{10}N_2O$	Hydracetine $CH_3COHN.NHC_6H_5$	150.09	128			
2694	$C_8H_{10}N_2O$	1-Methyl-1-phenylurea.......	150 09	82			
2695	$C_8H_{10}N_2O$	*p*-Nitrosodimethylaniline. . .	150 09	85			
2696	$C_8H_{10}N_2O_2$	*o*-Nitrodimethylaniline	166 09		154^{24}	1.179	
2697	$C_8H_{10}N_2O_2$	*m*-Nitrodimethylaniline	166 09	66	285	$1\ 313^{17}$	
2698	$C_8H_{10}N_2O_2$	*p*-Nitrodimethylaniline..	166 09	163			
2699	$C_8H_{10}N_2O_3$	3-Amino-4-methoxy-6-nitrotoluene	182 09	131 5			
2700	$C_8H_{10}N_2S$	Benzylthiourea $C_6H_5CH_2NHCSNH_2$.	166 16	162			
2701	$C_8H_{10}N_4O_2$	Caffeine (Theine)	194 11	237		1.23	
2702	$C_8H_{10}N_4O_3$	1, 3, 9-Trimethyluric acid	210 11	320 d.			
2703	$C_8H_{10}N_4O_3$	1, 7, 9-Trimethyluric acid	210.11	340			
2704	$C_8H_{10}N_4O_3$	2, 7, 9-Trimethyluric acid	210 11	380			
2705	$C_8H_{10}O$	2, 3-Dimethylphenol . ..	122 08	75	218		
2706	$C_8H_{10}O$	2, 4-Dimethylphenol . .	122 08	26	211 5	1.036	
2707	$C_8H_{10}O$	2, 6-Dimethylphenol	122 08	49	212		
2708	$C_8H_{10}O$	3, 4-Dimethylphenol	122 08	65	225 1		
2709	$C_8H_{10}O$	3, 5-Dimethylphenol	122 08	68	219 5		
2710	$C_8H_{10}O$	*o*-Ethylphenol	122 08	> −18	207 5	1.037^0	
2711	$C_8H_{10}O$	*m*-Ethylphenol	122 08	−4	214	1.025^0	
2712	$C_8H_{10}O$	*p*-Ethylphenol	122 08	46	219		
2713	$C_8H_{10}O$	Methylphenyl carbinol	122 08		205	1.003^{25}_{25}	
2713.1	$C_8H_{10}O$	*d*-Methylphenyl carbinol	122 08		100^{18}	1.014	668
2714	$C_8H_{10}O$	2-Phenylethyl alcohol $C_6H_5CH_2CH_2OH$	122 08		221	$1\ 024^{15}$	677
2715	$C_8H_{10}O$	*o*-Tolyl carbinol *o*-$CH_3C_6H_4CH_2OH$	122 08	34	223.3	1.023^{40}	
2716	$C_8H_{10}O$	*m*-Tolyl carbinol *m*-$CH_3C_6H_4CH_2OH$.	122.08	> −20	217	1.036^0	
2717	$C_8H_{10}O$	*p*-Tolyl carbinol *p*-$CH_3C_6H_4CH_2OH$.	122.08	59.5	217		
2718	$C_8H_{10}O$	Benzyl methyl ether $C_6H_5CH_2OCH_3$..	122 08		174	$0\ 987^{20}$	
2719	$C_8H_{10}O$	*o*-Cresyl methyl ether *o*-$CH_3C_6H_4OCH_3$	122.08		171 3	0.981	619
2720	$C_8H_{10}O$	*m*-Cresyl methyl ether...	122 08		177 2	$0\ 978^{13}_{4}$	627
2721	$C_8H_{10}O$	*p*-Cresyl methyl ether	122 08		176 5	0.970	646
2722	$C_8H_{10}O$	Phenetol $C_6H_5OC_2H_5$	122.08	−30 2	172	0.965	633
2723	$C_8H_{10}O_2$	Anis alcohol *p*-$CH_3OC_6H_4CH_2OH$	138.08	45	258.8	1.109^{26}	
2724	$C_8H_{10}O_2$	Caffeol	138 08		197		
2725	$C_8H_{10}O_2$	Creosol 3, 4-$CH_3O(OH)C_6H_3CH_3$	138.08	5 5	221.8	1 092	709
2726	$C_8H_{10}O_2$	3, 5-Dimethyl-*o*-dihydroxybenzene	138 08	74			
2727	$C_8H_{10}O_2$	4, 5-Dimethyl-*o*-dihydroxybenzene	138.08	82			
2728	$C_8H_{10}O_2$	2, 4-Dimethylresorcinol.....	138.08	150			
2729	$C_8H_{10}O_2$	2, 5-Dimethylresorcinol	138.08	163	280		
2730	$C_8H_{10}O_2$	4, 5-Dimethylresorcinol .	138.08	137			
2731	$C_8H_{10}O_2$	4, 6-Dimethylresorcinol	138 08	125	279		
2732	$C_8H_{10}O_2$	2, 3-Dimethylhydroquinone	138.08	221 s. d.			
2733	$C_8H_{10}O_2$	2, 5-Dimethylhydroquinone . .	138 08	213			
2734	$C_8H_{10}O_2$	2, 6-Dimethylhydroquinone	138 08	151			
2735	$C_8H_{10}O_2$	*p*-Homosaligenin...	138 08	105			
2736	$C_8H_{10}O_2$	Styrolene alcohol $HOCH_2CH_2OC_6H_5$	138 08	68	274 2		
2737	$C_8H_{10}O_2$	*o*-Dimethoxybenzene *o*-$C_6H_4(OCH_3)_2$.	138 08	22 5	206	$1\ 086^{15}$	
2738	$C_8H_{10}O_2$	*o*-Ethoxyphenol *o*-$HOC_6H_4OC_2H_5$	138 08	28	241		
2739	$C_8H_{10}O_2$	Hydroquinone dimethyl ether .	138.08	56	212.6	$1\ 053^{55}_{55}$	
2740	$C_8H_{10}O_2$	Hydroquinone monoethyl ether .. .	138 08	66	247		
2741	$C_8H_{10}O_2$	Resorcinol dimethyl ether	138 08	−55 3	215	$1\ 080^0_4$	
2742	$C_8H_{10}O_2$	Resorcinol monoethyl ether .	138 08		247		
2743	$C_8H_{10}O_2S$	Ethylphenylsulfone $C_2H_5SO_2C_6H_5$.	170.14	42	>300	1.010^{22}	
2744	$C_8H_{10}O_3$	3-Methoxy-4-hydroxybenzyl alcohol	154.08	115	d.		
2745	$C_8H_{10}O_3$	Crotonic anhydride	154.08		247.8	1.040	520
2746	$C_8H_{10}O_4$	Δ¹-Tetrahydro-*o*-phthalic acid	170.08	120			
2747	$C_8H_{10}O_4$	Δ¹-Tetrahydro-*o*-phthalic acid.	170.08	215			
2748	$C_8H_{10}O_4$	Diallyl oxalate $C_2O_4(C_3H_5)_2$.	170 08		217	1.055	
2749	$C_8H_{10}O_4$	Dimethyl muconate $(CH:CH.CO_2CH_3)_2$	170.08	75 u.; 156 st.			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2750	$C_8H_{10}O_8$	Succinic peroxide	234.08	127 d.			
2751	$C_8H_{11}BrN_4O_2$	Caffeine hydrobromide. .	275.03				1333
2752	$C_8H_{11}ClN_2O$	p-Nitrosodimethylaniline hydrochloride	186.56	177			
2753	$C_8H_{11}ClN_4O_2$	Caffeine hydrochloride.	230.58				1333
2753.1	$C_8H_{11}ClO_4$	Ethyl chloromaleate. . . .	206.54		125.5^{19}	1.191^{15}	
2754	$C_8H_{11}Cl_3O_6$	α-Chloralose.	309.46	230			
2755	$C_8H_{11}I_3N_4O_2$	Caffeine triiodide. . .	575.91	171			
2756	$C_8H_{11}N$	Dimethylaniline $C_6H_5N(CH_3)_2$	121.09	1.67	193.50	0.956	771
2757	$C_8H_{11}N$	2, 3-Dimethylaniline	121.09	> −15	223.8	0.992	756
2758	$C_8H_{11}N$	2, 4-Dimethylaniline	121.09		216	0.974	744
2759	$C_8H_{11}N$	2, 5-Dimethylaniline	121.09	15.5	217	0.980^{15}	968
2760	$C_8H_{11}N$	2, 6-Dimethylaniline	121.09		216.9	0.979	748
2761	$C_8H_{11}N$	3, 4-Dimethylaniline	121.09	49	226	1.076	
2762	$C_8H_{11}N$	3, 5-Dimethylaniline . .	121.09		221	0.972	742
2763	$C_8H_{11}N$	N-Ethylaniline $C_6H_5NH.C_2H_5$	121.09	−63.5	204.72	0.963	739
2764	$C_8H_{11}N$	o-Ethylaniline o-$C_2H_5C_6H_4NH_2$	121.09		216	0.983^{22}	
2765	$C_8H_{11}N$	m-Ethylaniline m-$C_2H_5C_6H_4NH_2$	121.09		215	0.990^{0}	
2766	$C_8H_{11}N$	p-Ethylaniline p-$C_2H_5C_6H_4NH_2$	121.09	−5	216.5	0.975^{22}	
2767	$C_8H_{11}N$	Methyl-o-toluidine $CH_3C_6H_4NCH_3$	121.09		207	0.977	750
2768	$C_8H_{11}N$	Methyl-m-toluidine.	121.09		206		
2769	$C_8H_{11}N$	Methyl-p-toluidine p-$CH_3C_6H_4NHCH_3$	121.09		208		
2770	$C_8H_{11}N$	α-Phenylethylamine $C_6H_5CH(NH_2)CH$	121.09		187.4	0.940^{15}	
2771	$C_8H_{11}N$	ω-Phenylethylamine $C_6H_5CH_2CH_2NH_2$	121.09		198.2	$0.958^{24.4}$	761
2772	$C_8H_{11}N$	2-Isopropylpyridine	121.09		159	0.934^{0}	
2773	$C_8H_{11}N$	4-Isopropylpyridine . .	121.09		178	0.944^{0}	
2774	$C_8H_{11}N$	2-Methyl-5-ethylpyridine	121.09		174	0.918^{22}	
2775	$C_8H_{11}N$	Nicotoine	121.09		208	0.955	643
2776	$C_8H_{11}N$	2-Propylpyridine (Conyrine)	121.09		165		
2777	$C_8H_{11}N$	2, 3, 4-Trimethylpyridine	121.09		188	0.913	
2778	$C_8H_{11}N$	2, 4, 5-Trimethylpyridine	121.09		168	0.966	
2779	$C_8H_{11}N$	2, 4, 6-Trinethylpyridine	121.09		172	0.917^{15}	
2780	$C_8H_{11}NO$	Hydroxyethylaniline	137.09		286	1.110^{0}	
2781	$C_8H_{11}NO$	o-Dimethylaminophenol	137.09	45	200		
2782	$C_8H_{11}NO$	o-Ethylaminophenol o-$HOC_6H_4NHC_2H_5$	139.09	107.5			
2783	$C_8H_{11}NO$	m-Ethylaminophenol	137.09	62	176^{12}		
2784	$C_8H_{11}NO$	3-Amino-2-methoxytoluene	137.09		223		
2785	$C_8H_{11}NO$	5-Amino-2-methoxytoluene	137.09	53			
2786	$C_8H_{11}NO$	o-Phenetidine o-$NH_2C_6H_4OC_2H_5$	137.09	> −21	229.2		
2787	$C_8H_{11}NO$	m-Phenetidine m-$NH_2C_6H_4OC_2H_5$	137.09		248		
2788	$C_8H_{11}NO$	p-Phenetidine p-$NH_2C_6H_4OC_2H_5$	137.09	2.4	254.2	1.061	
2789	$C_8H_{11}NO$	Dimethylaniline oxide $C_6H_5N(CH_3)_2O$	137.09	153			
2790	$C_8H_{11}NO$	Tyramine p-$HOC_6H_4CH_2CH_2NH_2$	137.09	161			
2791	$C_8H_{11}NO_3S$	m-Dimethylanilinesulfonic acid	201.16	266 d.			
2792	$C_8H_{11}NO_3S$	p-Dimethylanilinesulfonic acid	201.16	257			
2793	$C_8H_{11}NO_3S$	m-Ethylaniline sulfonic acid	201.16	294 d.			
2794	$C_8H_{11}N_3O$	Maretin m-$CH_3.C_6H_4NH.NHCONH_2$	165.11	184			
2795	C_8H_{12}	Dihydro-o-xylene	108.09		135		
2796	C_8H_{12}	$\Delta^{1,5}$-5-Dihydro-m-xylene.	108.09		130	0.823	497
2797	C_8H_{12}	$\Delta^{1,3}$-3-Dihydro-p-xylene.	108.09		135.6	0.830	529
2798	$C_8H_{12}ClN$	ω-Phenylethylamine hydrochloride	157.56	217			
2799	$C_8H_{12}N_2$	Dimethylketine . .	136.11	86	189		
2800	$C_8H_{12}N_2$	1, 1-Dimethyl-m-phenylenediamine	136.11		258	0.995^{25}	
2801	$C_8H_{12}N_2$	1, 1-Dimethyl-p-phenylenediamine.	136.11	41	262.3	1.036	
2802	$C_8H_{12}N_2$	2, 6-Dimethylphenylhydrazine	136.11	46			
2803	$C_8H_{12}N_2$	1-Ethyl-1-phenylhydrazine	136.11		237	1.018^{15}	
2804	$C_8H_{12}N_2$	1-Ethyl-2-phenylhydrazine	136.11		240		
2805	$C_8H_{12}N_2O_2$	Phenylhydrazine acetate	168.11	69			
2806	$C_8H_{12}N_2O_3$	n-Butylbarbituric acid.	184.11	215			
2807	$C_8H_{12}N_2O_3$	1, 3-Diethylbarbituric acid. . .	184.11	52	167^{19}		
2808	$C_8H_{12}N_2O_3$	5, 5-Diethylbarbituric acid .	184.11	191			
2808.1	$C_8H_{12}N_2O_4$	Tetraacetylhydrazine $[(CH_3CO)_2N]_2$.	200.11	86			1203
2809	$C_8H_{12}O$	Amylpropiolic aldehyde. . .	124.09		187	0.89^{0}	
2810	$C_8H_{12}O_2$	Ethyl sorbate $CH_3(CH:CH)_2CO_2C_2H_5$.	140.09		76.5^{12}	0.936	608

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No
2811	$C_8H_{12}O_4$	Terpenylic acid	172.09	89			
2812	$C_8H_{12}O_4$	Diethyl fumarate $(.CHCO_2C_2H_5)_2$.	172.09	0.6	218.5	1.052	377
2813	$C_8H_{12}O_4$	*Diethyl maleate* $(.CHCO_2C_2H_5)_2$.	172.09		225	1.067	375
2814	$C_8H_{12}O_4$	*Ethyl diacetoacetate*	172.09		211 s. d.	1.09	492
2815	$C_8H_{12}O_4$	*Dimeric diacetyl*	172.09	58		$1.560^{29.8}_{4}$	
2816	$C_8H_{12}O_5$	*Ethyl oxalacetate*	188.09		132^{24}	1.172	905
2816.1	$C_8H_{13}BrO_4$	*Diethyl bromoisosuccinate*	253.02		122^{13}	1.3183^{25}	
2817	$C_8H_{13}N$	Granatic acid	123.11	270			
2818	$C_8H_{13}N$	Tropidine	123.11		163	0.946	946
2819	$C_8H_{13}NO$	Tropinone	139.11	41	218.5	$0.987^{99.6}$	1141
2820	$C_8H_{13}NO_2$	Arecolidine	155.11	110			
2821	$C_8H_{13}NO_2$	Arecoline	155.11		220		
2822	$C_8H_{13}NO_2$	Scopoline	155.11	110	243	1.016^{105}_{4}	
2823	$C_8H_{13}N_3O_2$	Iminodiethylbarbituric acid	183.12	295			
2824	C_8H_{14}	*n*-Hexylacetylene $C_6H_{13}C\vdots CH$	110.11		125	0.770^0	818
2825	C_8H_{14}	*d*-Laurolene	110.11		120.5	0.797	397
2826	C_8H_{14}	Methyl-*n*-amylacetylene	110.11		134		
2827	C_8H_{14}	1, 2, 3, 4-Tetrahydro-*m*-xylene	110.11		124	0.801	398
2828	$C_8H_{14}BrNO_2$	Arecoline hydrobromide	236.03	168			
2829	$C_8H_{14}ClNO_2$	Arecolidine hydrochloride	191.57	98	250 d.		
2830	$C_8H_{14}O$	1, 1-Dimethylcyclohexene-3-ol	126.11		75^{15}	0.933	926
2831	$C_8H_{14}O$	2, 2-Dimethylcyclohexanone	126.11		172.5	0.913	426
2832	$C_8H_{14}O$	2, 6-Dimethylcyclohexanone	126.11		55.3^{10}	0.914	813
2833	$C_8H_{14}O$	Crotonyl ether $(CH_3CH.CHCH_2)_2O$.	126.11		145	0.890^0	
2834	$C_8H_{14}O$	2-Methyl-2-heptene-6-one	126.11	−67.3	174	0.860	
2835	$C_8H_{14}O$	Homomesityl oxide	126.11		160^{625}	0.863	406
2836	$C_8H_{14}O_2$	Allyl isovalerate $C_4H_9CO_2C_3H_5$	142.11		155		
2837	$C_8H_{14}O_2$	Cyclohexyl acetate $CH_3CO_2C_6H_{11}$	142.11		177		
2838	$C_8H_{14}O_2$	Methyl hexahydrobenzoate	142.11		183	0.995^{15}_{4}	
2839	$C_8H_{14}O_3$	Dialdan	158.11	130			
2840	$C_8H_{14}O_3$	*n*-Butyric anhydride $(C_4H_9CO)_2O$	158.11	−75.0	198.2	0.969	
2841	$C_8H_{14}O_3$	Isobutyric anhydride $[(CH_3)_2CHCO]_2O$	158.11	−53.5	182.5	0.950	
2842	$C_8H_{14}O_3$	1-Ethyl-3-acetylbutyric acid	158.11		158^9		
2843	$C_8H_{14}O_4$	*n*-Amylmalonic acid $C_5H_{11}CH(CO_2H)_2$	174.11		140 d.		
2844	$C_8H_{14}O_4$	2, 2′-Dimethyladipic acid	174.11	82	321		
2845	$C_8H_{14}O_4$	Suberic acid $HO_2C(CH_2)_6CO_2H$.	174.11	76	279^{100}		
2846	$C_8H_{14}O_4$	Diethyl methylmalonate	174.11	140	201.4	1.018	203
2847	$C_8H_{14}O_4$	Diethyl succinate $(CH_2CO_2C_2H_5)_2$	174.11		216.5	1.042	246
2848	$C_8H_{14}O_4$	Di-*n*-propyl oxalate $(CO_2C_3H_7)_2$	174.11	−20.8	211	1.018^{22}	
2849	$C_8H_{14}O_4$	Ethyl isopropyl malonate	174.11		217 d.	0.987^{25}_{25}	
2849.1	$C_8H_{14}O_5$	Diethyl malate	190.11		253	1.128	355
2850	$C_8H_{14}O_6$	Diethyl *d*-tartrate $[CH(OH)CO_2C_2H_5]_2$.	206.11	17	280	1.202	421
2851	$C_8H_{15}ClO$	Capryl chloride $C_7H_{15}COCl$	162.57		196	0.975^8	
2852	$C_8H_{15}N$	*n*-Caprylonitrile $C_7H_{15}CN$	125.12		200	$0.820^{14.3}$	
2853	$C_8H_{15}N$	α-Coniceine	125.12	−16	158	0.893^{15}	
2854	$C_8H_{15}N$	β-Coniceine	125.12	41	169		
2855	$C_8H_{15}N$	γ-Coniceine	125.12	> −50	172	0.872	945
2856	$C_8H_{15}N$	δ-Coniceine	125.12		161.5	0.901^{15}_{4}	
2857	$C_8H_{15}N$	Granatinine	125.12	60			
2858	$C_8H_{15}N$	Pseudoconiceine	125.12		172	0.878	
2859	$C_8H_{15}N$	Tropane	125.12		167	0.930	975
2860	$C_8H_{15}NO$	Granatoline	141.12	134			
2861	$C_8H_{15}NO$	Hygrine	141.12		195	0.935	
2862	$C_8H_{15}NO$	Pelletierine	141.12		195 d.	0.988^0	
2863	$C_8H_{15}NO$	Pseudotropine	141.12	108	243		
2864	$C_8H_{15}NO$	Tropine	141.12	63	233	1.016^{100}_{4}	1146
2865	C_8H_{16}	Cyclooctane $(CH_2)_8$	112.12	14.4	150.6	0.839	
2866	C_8H_{16}	Diisobutylene $(CH_3)_2C{:}CHC(CH_3)_3$	112.12		102.6	0.715^{15}	
2867	C_8H_{16}	*o*-Dimethylcyclohexane	112.12	−57.5	129.4	0.779	317
2868	C_8H_{16}	*m*-Dimethylcyclohexane	112.12	−85	123.7	0.771	288
2869	C_8H_{16}	*p*-Dimethylcyclohexane	112.12	−86	120.5	0.769	257
2870	C_8H_{16}	Ethylcyclohexane $C_2H_5.C_6H_{11}$	112.12		128		
2871	C_8H_{16}	2-Methyl-3-ethyl-2-pentene	112.12		117.1		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2872	C_8H_{16}	2-Methyl-2-heptene $(CH_3)_2C:CHC_4H_9$	112.12		125.2	0.816	
2873	C_8H_{16}	4-Methyl-3-heptene	112.12		120.4	0.724	219
2874	C_8H_{16}	*n*-Octylene $CH_3(CH_2)_5CH:CH_2$	112.12		123	0.722^{17}	
2875	$C_8H_{16}BrNO$	Pelletierine hydrobromide	222.05	140			
2876	$C_8H_{16}ClNO$	Pelletierine hydrochloride	177.59	145			
2877	$C_8H_{16}N_2O_4$	Ethylidene diurethane	204.14	126			
2878	$C_8H_{16}O$	1, 2-Dimethylcyclohexanol	128.12		166	0.926^{14}_{4}	834
2879	$C_8H_{16}O$	*d*-1, 3-Dimethylcyclohexanol	128.12	72	69^{14}		
2880	$C_8H_{16}O$	*dl*-1, 3-Dimethylcyclohexanol	128.12		169	0.911^{14}_{4}	832
2881	$C_8H_{16}O$	1, 4-Dimethylcyclohexanol	128.12	50	170		
2882	$C_8H_{16}O$	2, 2-Dimethylcyclohexanol	128.12	8	72.2^{11}	0.923	496
2883	$C_8H_{16}O$	2, 4-Dimethylcyclohexanol	128.12		179	0.912	888
2884	$C_8H_{16}O$	2, 5-Dimethylcyclohexanol	128.12		178.5	0.907	887
2885	$C_8H_{16}O$	2, 6-Dimethylcyclohexanol	128.12		174.7		
2886	$C_8H_{16}O$	3, 3-Dimethylcyclohexanol	128.12	11	99.5^{16}	0.913^{14}_{4}	468
2887	$C_8H_{16}O$	3, 4-Dimethylcyclohexanol	128.12		189.2	0.907	889
2888	$C_8H_{16}O$	*cis*-3, 5-Dimethylcyclohexanol	128.12		185	0.911	447
2889	$C_8H_{16}O$	*trans*-3, 5-Dimethylcyclohexanol	128.12		187.5	0.902^{16}	463
2890	$C_8H_{16}O$	2-Methyl-2-heptene-6-ol	128.12		176	0.854	434
2891	$C_8H_{16}O$	Isoamyl allyl ether	128.12		120		
2892	$C_8H_{16}O$	*n*-Caprylic aldehyde $C_7H_{15}CHO$	128.12		81^{32}	0.821	261
2893	$C_8H_{16}O$	Ethyl *n*-amyl ketone $C_2H_5COC_5H_{11}$	128.12		168	0.850^{0}	
2894	$C_8H_{16}O$	Ethyl isoamyl ketone	128.12		163.5		
2895	$C_8H_{16}O$	Methylbutyrone.	128.12		180	0.827^{16}	
2896	$C_8H_{16}O$	Methyl hexyl ketone $CH_3COC_6H_{13}$	128.12	−21.6	172.7	0.818	225
2897	$C_8H_{16}O$	Methyl isohexyl ketone	128.12		204	0.817	
2898	$C_8H_{16}O$	Propyl isobutyl ketone	128.12		155	0.813	
2899	$C_8H_{16}O_2$	*n*-Caprylic acid $CH_3(CH_2)_6CO_2H$	144.12	16	237.5	0.910	296
2900	$C_8H_{16}O_2$	Triethylacetic acid $(C_2H_5)_3CCO_2H$	144.12	39.5	202		
2901	$C_8H_{16}O_2$	Isoamyl propionate	144.12		160.2	0.870	163
2901.1	$C_8H_{16}O_2$	*d*-β-Amyl propionate	144.12		58^{16}	0.866	133
2902	$C_8H_{16}O_2$	*tert.*-Amyl propionate	144.12		143.5	0.855^{15}	
2903	$C_8H_{16}O_2$	Butyl *n*-butyrate $C_3H_7CO_2C_4H_9$	144.12		166.4	0.872^{20}_{20}	148
2904	$C_8H_{16}O_2$	Isobutyl *n*-butyrate	144.12		156.9	0.866^{15}_{15}	140
2905	$C_8H_{16}O_2$	Isobutyl isobutyrate	144.12	−80.7	148.7	0.875^{0}_{4}	120
2906	$C_8H_{16}O_2$	*tert.*-Butylethyl acetate	144.12		157		
2907	$C_8H_{16}O_2$	Ethyl *n*-caproate $C_5H_{11}CO_2C_2H_5$	144.12		166.6	0.875^{15}_{4}	
2908	$C_8H_{16}O_2$	Heptyl formate $HCO_2(CH_2)_6CH_3$	144.12		176.7	0.894^{0}	
2909	$C_8H_{16}O_2$	*n*-Hexyl acetate $CH_3CO_2(CH_2)_5CH_3$	144.12		169.2	0.890^{0}_{0}	
2909.1	$C_8H_{16}O_2$	*d*-β-Hexyl acetate....	144.12		57^{20}	0.864	139
2910	$C_8H_{16}O_2$	Methyl *n*-heptylate $C_6H_{11}CO_2CH_3$	144.12		172.1	0.881^{15}_{4}	187
2911	$C_8H_{16}O_2$	*n*-Propyl *n*-valerate $C_4H_9CO_2C_3H_7$	144.12		167.5	0.889^{0}	
2912	$C_8H_{16}O_2$	*n*-Propyl isovalerate	144.12		155.9	0.863	141
2913	$C_8H_{16}O_3$	1-Hydroxy-*n*-caprylic acid	160.12	69.5			
2914	$C_8H_{16}O_3$	Amyl *l*-lactate $CH_3CH(OH)CO_2C_5H_{11}$	160.12		$110.5^{21.5}$	0.964^{4}	
2915	$C_8H_{16}O_4$	Metaldehyde $(C_2H_4O)_4$	176.12		150		1172
2916	$C_8H_{16}O_4$	Paraldol $(C_4H_8O_2)_2$	176.12	82			
2916.1	$C_8H_{16}O_4$	Bismethoxyacetal	176.12	127			1238
2917	$C_8H_{16}O_6$	Dambonite (Inosite dimethyl ether).	208.12	195	210		
2918	$C_8H_{16}O_6$	2, 3-Dimethyl-α-glucose	208.12	87			
2919	$C_8H_{16}O_6$	2, 3-Dimethyl-β-glucose	208.12	110			
2920	$C_8H_{16}O_6$	*d*, α-Ethylglucoside	208.12	114			1197
2921	$C_8H_{16}O_7$	Ethyl *d*-gluconate.	224.12	65			
2922	$C_8H_{17}Br$	*n*-Octyl bromide $CH_3(CH_2)_6CH_2Br$	193.05		204	1.116^{16}	
2922.1	$C_8H_{17}Br$	*l*-2-Bromooctane	193.05		71^{14}	1.091^{17}	
2923	$C_8H_{17}BrN_4$	Hexamethylenetetramine bromoethylate (Bromalin)	249.08	200			
2924	$C_8H_{17}Cl$	*n*-Octyl chloride $CH_3(CH_2)_6CH_2Cl$	148.59		184.6	0.879^{15}	
2925	$C_8H_{17}Cl$	2-Chlorooctane $C_6H_{13}CHClCH_3$	148.59		173	0.871^{15}	
2926	$C_8H_{17}F$	*n*-Octyl fluoride $CH_3(CH_2)_6CH_2F$	132.13		142.5	$0.812^{14.1}$	94
2927	$C_8H_{17}I$	*n*-Octyl iodide $CH_3(CH_2)_6CH_2I$	240.06	−45.9	225.5	$1.341^{14.5}_{4}$	549
2928	$C_8H_{17}N$	*d*-Coniine	127.14	−2.5	166.5	0.845	978
2929	$C_8H_{17}N$	2, 4, 6-Trimethylpiperidine	127.14		147	0.831	954

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
2930	$C_8H_{17}NO$	Conhydrine (Hydroxyconiine)	143.14	118	226		**1338**
2931	$C_8H_{17}NO$	α-Pseudoconhydrine	143.14	106	236.5		
2932	$C_8H_{17}NO_2$	1-Hydroxy-*n*-caprylic amide	159.14	150			
2933	C_8H_{18}	2, 5-Dimethylhexane	114.14	−91.0	109.2	0.693	**87**
2934	C_8H_{18}	2, 3-Dimethylhexane	114.14		114.0	0.725$^{15}_{15}$	**178**
2935	C_8H_{18}	2, 4-Dimethylhexane	114.14		109.9	0.708$^{15}_{15}$	**138**
2936	C_8H_{18}	3, 4-Dimethylhexane	114.14		116.5	0.721	**156**
2937	C_8H_{18}	Isooctane $(CH_3)_2CH(CH_2)_4CH_3$	114.14		116.0	0.704$^{15}_{4}$	**103**
2938	C_8H_{18}	2-Methyl-3-ethylpentane	114.14		114	0.708^{15}	**134**
2939	C_8H_{18}	3-Methylheptane $C_2H_5CH(CH_3)C_4H_9$	114.14		122.2	0.707	
2940	C_8H_{18}	4-Methylheptane $(C_3H_7)_2CHCH_3$	114.14		118.0	0.722	**114**
2941	C_8H_{18}	*n*-Octane $CH_3(CH_2)_6CH_3$	114.14	−56.5	124.6	0.707$^{15}_{15}$	**112**
2942	C_8H_{18}	2-Ethylhexane $CH_3(C_2H_5)CHC_4H_9$	114.14		118.8	0.717$^{15}_{4}$	**135**
2942.1	C_8H_{18}	3-Ethylhexane $(C_2H_5)_2CHC_3H_7$	114.14		115	0.715	
2943	C_8H_{18}	2, 2, 3, 3-Tetramethylbutane	114.14	104	106.8		
2944	C_8H_{18}	2, 2, 3-Trimethylpentane	114.14		110.8	0.722$^{15}_{15}$	**233**
2945	$C_8H_{18}BrN$	*d*-Coniine hydrobromide	208.06	211			
2946	$C_8H_{18}ClN$	*d*-Coniine hydrochloride	163.61	217			
2947	$C_8H_{18}ClNO$	Pseudoconhydrine hydrochloride	179.61	213			
2948	$C_8H_{18}IN$	Coniine hydroiodide	255.08	146			
2949	$C_8H_{18}N_2O$	Nitrosodiisobutylamine	158.16	−5	221	0.893$^{25}_{25}$	
2950	$C_8H_{18}N_2O_3$	Coniine nitrate	190.16	83			
2951	$C_8H_{18}O$	Dibutyl alcohol	130.14		181.2	0.848^{0}	
2952	$C_8H_{18}O$	Diethylpropyl carbinol	130.14		160.5	0.838	**339**
2953	$C_8H_{18}O$	Dimethyl-*n*-amyl carbinol	130.14		162	0.879	**322**
2954	$C_8H_{18}O$	Dimethylisoamyl carbinol	130.14		154	0.823	**254**
2955	$C_8H_{18}O$	Ethylisoamyl carbinol	130.14	−61	166	0.808	**247**
2956	$C_8H_{18}O$	1-Hydroxy-2, 5-dimethylhexane	130.14		179.5	0.828	
2957	$C_8H_{18}O$	2-Hydroxy-2, 4-dimethylhexane	130.14		151		
2958	$C_8H_{18}O$	4-Hydroxy-3-ethylhexane	130.14		164	0.835^{0}	
2959	$C_8H_{18}O$	2-Hydroxy-4-methylheptane	130.14		168		
2960	$C_8H_{18}O$	*d*-6-Hydroxy-3-methylheptane	130.14		169	0.817	
2961	$C_8H_{18}O$	4-Hydroxy-2, 2, 4-trimethylpentane	130.14	−20	147.5	0.842^{0}	
2962	$C_8H_{18}O$	Methyl dipropyl carbinol	130.14		161.5	0.823	**297**
2963	$C_8H_{18}O$	Methylethylbutylcarbinol	130.14		160.6	0.827	**298**
2964	$C_8H_{18}O$	Methylethylisobutyl carbinol	130.14		152.4	0.830^{15}	**308**
2965	$C_8H_{18}O$	Methylisohexyl carbinol	130.14		172	0.813	**274**
2966	$C_8H_{18}O$	*n*-Octyl alcohol $CH_3(CH_2)_7OH$	130.14	−16.3	194	0.827	**318**
2967	$C_8H_{18}O$	*d*-*sec*.-Octyl alcohol $C_6H_{13}CH(OH)CH_3$	130.14		86^{20}	0.822	**279**
2968	$C_8H_{18}O$	*dl*-*sec*.-Octyl alcohol $C_6H_{13}CH(OH)CH_3$	130.14	−38.6	178.5	0.819	**357**
2969	$C_8H_{18}O$	Propylbutyl carbinol	130.14		71^{10}	0.838$^{0}_{4}$	
2970	$C_8H_{18}O$	Propylisobutyl carbinol	130.14		164	0.821	**248**
2971	$C_8H_{18}O$	Isopropylbutyl carbinol	130.14		154	0.825	**249**
2972	$C_8H_{18}O$	Isopropylisobutyl carbinol	130.14		163	0.820^{15}	
2973	$C_8H_{18}O$	*n*-Butyl ether $C_4H_9OC_4H_9$	130.14		140.9	0.769$^{20}_{20}$	
2974	$C_8H_{18}O$	Isobutyl ether $[(CH_3)_2CHCH_2]_2O$	130.14		122.5	0.762	
2975	$C_8H_{18}O$	*sec*.-Butyl ether $(C_2H_5CHCH_3)_2O$.	130.14		121	0.756^{21}	
2976	$C_8H_{18}O$	Ethyl hexyl ether $C_2H_5OC_6H_{13}$.	130.14		137		
2977	$C_8H_{18}O$	Methyl *n*-heptyl ether $CH_3OC_7H_{15}$	130.14		149.8	0.795$^{0}_{0}$	
2978	$C_8H_{18}O_2S$	*n*-Butylsulfone $(C_4H_9)_2SO_2$	178.20	43.5			
2979	$C_8H_{18}O_3$	Ethyl orthoacetate $CH_3CH(OC_2H_5)_3$	162.14		142	0.94^{22}	
2980	$C_8H_{18}O_4S_2$	Trional $C_2H_5(CH_3)C(SO_2C_2H_5)_2$	242.27	76			
2981	$C_8H_{18}S$	Di-*n*-butyl sulfide $(C_4H_9)_2S$	146.20	−79.7	182	0.852^{0}	
2982	$C_8H_{18}S$	Diisobutyl sulfide $[(CH_3)_2CHCH_2]_2S$.	146.20		171	0.836^{10}	
2983	$C_8H_{18}S$	Di-*sec*.-butyl sulfide $[C_2H_5CHCH_3]_2S$.	146.20		165	0.832^{22}	
2984	$C_8H_{19}N$	Di-*n*-butylamine $(C_4H_9)_2NH$	129.15		161		
2985	$C_8H_{19}N$	Diisobutylamine $[(CH_3)_2CHCH_2]_2NH$.	129.15	−70.0	138.8	0.745	**180**
2986	$C_8H_{19}N$	*n*-Octylamine $C_8H_{17}NH_2$	129.15		180	0.777^{27}	**319**
2987	$C_8H_{19}N$	*sec*.-Octylamine $C_6H_{13}CH(CH_3)NH_2$	129.15		164	0.771	**292**
2988	$C_8H_{20}As_2$	Ethylcacodyl $(C_2H_5)_2As_2(C_2H_5)_2$	266.07		190		
2989	$C_8H_{21}NO$	Tetraethylammonium hydroxide	147.17	190 d.			
2990	$C_9H_4O_4$	Phthalonic anhydride	176.03	186			
2991	$C_9H_5Cl_2N$	2, 3-Dichloroquinoline	197.96	105			
2992	$C_9H_5Cl_2N$	2, 4-Dichloroquinoline	197.96	67			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
2993	$C_9H_5Cl_2N$	5, 6-Dichloroquinoline	197.96	85			
2994	$C_9H_5Cl_2N$	5, 7-Dichloroquinoline	197.96	117			
2995	$C_9H_5Cl_2N$	5, 8-Dichloroquinoline	197.96	93			
2996	$C_9H_5Cl_2N$	6, 8-Dichloroquinoline	197.96	104			
2997	$C_9H_5Cl_2N$	7, 8-Dichloroquinoline	197.96	85.5			
2998	$C_9H_6Br_2O_2$	*cis*-1, 2-Dibromocinnamic acid	216.96	100	$124^{0.5}$		
2999	$C_9H_6Br_2O_2$	*trans*-2, 2-Dibromocinnamic acid	216.96	136	$138^{0.6}$		
3000	C_9H_6ClN	2-Chloroquinoline	163.51	38	275		
3001	C_9H_6ClN	3-Chloroquinoline	163.51		255.5		
3002	C_9H_6ClN	4-Chloroquinoline	163.51	34	260.4	1.251	
3003	C_9H_6ClN	5-Chloroquinoline	163.51	32	268		
3004	C_9H_6ClN	6-Chloroquinoline	163.51	41	262		
3005	C_9H_6ClN	7-Chloroquinoline	163.51	45	256		
3006	C_9H_6ClN	8-Chloroquinoline	163.51	> −20	288		
3007	$C_9H_6Cl_2O_2$	*cis*-1, 2-Dichlorocinnamic acid	216.96	121			
3008	$C_9H_6Cl_2O_2$	*trans*-1, 2-Dichlorocinnamic acid	216.96	101			
3009	$C_9H_6INO_4S$	Loretin	351.05	d.			
3010	$C_9H_6N_2O_2$	5-Nitroquinoline	174.06	72			
3011	$C_9H_6N_2O_2$	6-Nitroquinoline	174.06	150			
3012	$C_9H_6N_2O_2$	7-Nitroquinoline	174.06	133			
3013	$C_9H_6N_2O_2$	8-Nitroquinoline	174.06	89			
3014	$C_9H_6O_2$	Phenylpropiolic acid $C_6H_5C{:}CCO_2H$	146.04	137			
3015	$C_9H_6O_2$	Chromone	146.04	58			
3016	$C_9H_6O_2$	Coumarine	146.04	67	301.7	0.935	
3017	$C_9H_6O_3$	Umbelliferon	162.04	227			
3018	$C_9H_6O_4$	Daphnetin	178.05	256			
3019	$C_9H_6O_4$	Esculetin	178.05	270 d.			
3020	$C_9H_6O_6$	Hemimellitic acid 1, 2, 3-$C_6H_3(CO_2H)_3$	210.04	190			
3021	$C_9H_6O_6$	Trimellitic acid 1, 2, 4-$C_6H_3(CO_2H)_3$	210.05	216			
3022	$C_9H_6O_6$	Trimesic acid 1, 3, 5-$C_6H_3(CO_2H)_3$	210.05	350			
3023	$C_9H_6O_7$	1, 3, 5-Tricarboxyphenol	226.05	180 d.			
3024	$C_9H_7BrO_2$	*cis*-Allo-1-bromocinnamic acid	226.97	120	$111^{0.6}$		
3025	$C_9H_7BrO_2$	*cis*-Allo-2-bromocinnamic acid	226.97	160	$111^{0.6}$		
3026	$C_9H_7BrO_2$	*trans*-1-Bromocinnamic acid	226.97	131	$121^{0.6}$		
3027	$C_9H_7BrO_2$	*trans*-2-Bromocinnamic acid	226.97	135	$122^{0.6}$		
3028	C_9H_7ClO	Cinnamyl chloride $C_6H_5CH{:}CHCOCl$.	166.51	36	257.5		
3029	$C_9H_7ClO_2$	*cis*-Allo-1-chlorocinnamic acid	182.51	111	$99^{0.6}$		
3030	$C_9H_7ClO_2$	*cis*-Allo-2-chlorocinnamic acid	182.51	132	$97^{0.5}$		
3031	$C_9H_7ClO_2$	*trans*-1-Chlorocinnamic acid	182.51	137	$109^{0.5}$		
3032	$C_9H_7ClO_2$	*trans*-2-Chlorocinnamic acid	182.51	142	$113^{0.5}$		
3033	$C_9H_7ClO_2$	*o*-Chlorocinnamic acid	182.51	211			
3034	$C_9H_7Cl_3O_2$	Benzyl trichloroacetate	253.43		178.5^{60}	1.389^{4}_{4}	**692**
3035	C_9H_7N	Cinnamic nitrile $C_6H_5CH{:}CHCN$	129.06	11	255	1.037^{0}	
3036	C_9H_7N	Isoquinoline	129.06	23	243	1.099	**1026**
3037	C_9H_7N	Quinoline	129.06	−19.5	237.7	1.093	**941**
3038	C_9H_7NO	*p*-Cyanoacetophenone $CN.C_6H_4COCH_3$	145.06	61			
3039	C_9H_7NO	2-Hydroxyquinoline	145.06	200			
3040	C_9H_7NO	4-Hydroxyquinoline	145.06	201	300		
3041	C_9H_7NO	5-Hydroxyquinoline	145.06	224			
3042	C_9H_7NO	6-Hydroxyquinoline	145.06	193	360		
3043	C_9H_7NO	7-Hydroxyquinoline	145.06	238 d.			
3044	C_9H_7NO	8-Hydroxyquinoline	145.06	76	266.9		
3045	$C_9H_7NO_2$	3-Aminocoumarine	161.06	130			
3046	$C_9H_7NO_2$	Indole-2-carboxylic acid	161.06	203 d.			
3047	$C_9H_7NO_2$	Indole-3-carboxylic acid	161.06	218 d.			
3048	$C_9H_7NO_3$	Indoxylic acid	177.06		123		
3049	$C_9H_7NO_3$	Kynuric acid	177.06	189			
3050	$C_9H_7NO_4$	*o*-Nitrocinnamic acid	193.06	240			
3051	$C_9H_7NO_4$	*m*-Nitrocinnamic acid	193.06	197			
3052	$C_9H_7NO_4$	*p*-Nitrocinnamic acid	193.06	286			
3053	$C_9H_7NO_4S$	Diaphthol	225.13	295			
3054	C_9H_8	Indene	116.06	−2	182.4	1.006	**806**
3055	C_9H_8	Phenylallylene $C_6H_5C{:}CCH_3$	116.06		185		
3056	$C_9H_8Cl_2$	Cinnamal chloride $C_6H_5CH{:}CH_2CHCl$.	186.98	58.5	143^{30}		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3057	$C_9H_8Cl_2O_2$	Benzyl dichloroacetate	218 98		179^{60}	1.313^4_4	684
3058	$C_9H_8I_2O_3$	Ethyl 3, 5-diiodosalicylate	417 93	132			
3059	$C_9H_8N_2$	2-Aminoquinoline	144 08	129			
3060	$C_9H_8N_2$	3-Aminoquinoline	144 08	94			1319
3061	$C_9H_8N_2$	4-Aminoquinoline	144 08	154			
3062	$C_9H_8N_2$	5-Aminoquinoline	144 08	110			
3063	$C_9H_8N_2$	6-Aminoquinoline	144 08	114			
3064	$C_9H_8N_2$	7-Aminoquinoline	144 08	189			
3065	$C_9H_8N_2$	8-Aminoquinoline	144 08	70			
3066	$C_9H_8N_2$	3-Phenylpyrazolone	144 08	240			
3067	$C_9H_8N_2O$	Cyanoacetanilide $CNCH_2CONHC_6H_5$	160 08	200			
3068	$C_9H_8N_2O$	Pyrrone (Dipyrryl ketone)	160 08	160			
3069	C_9H_8O	Cinnamic aldehyde $C_6H_5CH.CHCHO$	132 06	−7.5	251.0	1.049	791
3070	C_9H_8O	α-Hydrindone	132 06	41	244	1.101^{45}	
3071	C_9H_8O	β-Hydrindone	132 06	61	225 d.	1.071^{67}	1100
3072	$C_9H_8O_2$	*o*-Coumaric aldehyde	148 06	133			
3073	$C_9H_8O_2$	*p*-Coumaric aldehyde	148 06	134			
3074	$C_9H_8O_2$	Allocinnamic acid	148 06	68	125^{19}		
3075	$C_9H_8O_2$	Cinnamic acid $C_6H_5CH.CHCO_2H$	148 06	133	300	1.284^4	
3076	$C_9H_8O_2$	Isocinnamic acid	148 06	57	256 d.		
3077	$C_9H_8O_2$	Atropic acid	148 06	107	267 d.		
3078	$C_9H_8O_2$	Melilotic anhydride	148 06	25	272		
3079	$C_9H_8O_2$	Chromanone	148 06	38 5	160^{50}		
3080	$C_9H_8O_3$	Acetopiperone	164 06	83			
3081	$C_9H_8O_3$	*o*-Acetylsalicylic aldehyde	164 06	37	253		
3082	$C_9H_8O_3$	Benzoylacetic acid $C_6H_5COCH_2CO_2H$	164 06	104			
3083	$C_9H_8O_3$	*o*-Coumaric acid	164 06	208			
3084	$C_9H_8O_3$	*m*-Coumaric acid	164 06	191			
3085	$C_9H_8O_3$	*p*-Coumaric acid	164 06	206			
3086	$C_9H_8O_3$	Phenylpyruvic acid $C_6H_5CH_2COCO_2H$	164 06	157			
3087	$C_9H_8O_4$	*o*-Acetylsalicylic acid (Aspirin)	180 06	133 5			1290
3088	$C_9H_8O_4$	Caffeic acid	180 06	195			
3089	$C_9H_8O_4$	Phenylmalonic acid $C_6H_5CH(CO_2H)_2$.	180 06	153			
3090	$C_9H_8O_4$	Uvitic acid 3, $5(CO_2H)_2C_6H_3CH_3$	180 06	290			
3091	$C_9H_8O_4$	Methyl phthalate *o*-$CO_2HC_6H_4CO_2CH_3$	180 06	82 5			
3092	$C_9H_8O_4$	Benzoyl acetyl peroxide	180 06	36 6	130^{19}		
3093	$C_9H_8O_5$	Esculetinic acid	196 06	168			
3094	$C_9H_8O_5$	Myristicinic acid	196 06	210	300		
3095	C_9H_9BrO	Indene oxybromide	212 99	130 5			
3096	$C_9H_9ClO_2$	Benzyl chloroacetate	184 53		147.5^9	1.222^4_4	675
3097	C_9H_9N	Dihydroquinoline	131 08	226			
3098	C_9H_9N	1-Methylindole	131 08		242 4	$1\ 071^0$	
3099	C_9H_9N	2-Methylindole	131 08	60	272 3		
3100	C_9H_9N	3-Methylindole (Scatole)	131.08	95	266 2		
3101	C_9H_9N	5-Methylindole	131 08	58 5			
3102	C_9H_9NO	Cinnamamide $C_6H_5CH{\cdot}CHCONH_2$.	147.08	141.5			
3103	C_9H_9NO	Hydrocarbostyril	147 08	163			1309
3104	$C_9H_9NO_2$	*o*-Aminocinnamic acid	163 08	159 d.			
3105	$C_9H_9NO_2$	*m*-Aminocinnamic acid	163 08	181			
3106	$C_9H_9NO_2$	*p*-Aminocinnamic acid	163 08	176 d.			
3107	$C_9H_9NO_2$	Benzoylacetaldehydeoxime	163.08	87			
3108	$C_9H_9NO_3$	*o*-Acetylaminobenzoic acid	179 08	185			
3109	$C_9H_9NO_3$	*m*-Acetylaminobenzoic acid	179 08	250			
3110	$C_9H_9NO_3$	*p*-Acetylaminobenzoic acid	179 08	252			
3111	$C_9H_9NO_3$	Hippuric acid $C_6H_5CONHCH_2CO_2H$	179 08	187 5	d.	1 371	1256
3112	$C_9H_9NO_3$	Methyl oxanilate $C_6H_5NHCOCO_2CH_3$.	179 08	114			
3113	$C_9H_9NO_3$	Acetylsalicylamide	179.08	144			
3114	$C_9H_9NO_4$	Salicyluric acid	195 08	160			
3115	$C_9H_9NO_4$	Ethyl *m*-nitrobenzoate	195.08	47	298		
3116	$C_9H_9NO_4$	Ethyl *p*-nitrobenzoate	195.08	57			
3117	$C_9H_9N_3$	5, 8-Diaminoquinoline	159.09	156			
3118	$C_9H_9N_3$	6, 8-Diaminoquinoline	159.09	163			
3119	C_9H_{10}	Benzylethylene $C_6H_5CH_2CH{:}CH_2$	118 08		155	0.909	654

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3120	C_9H_{10}	Isoallylbenzene $C_6H_5CH.CHCH_3$	118 08		175	0 924^{16}	
3121	C_9H_{10}	Hydrindene	118 08		176 5	0 965	970
3122	$C_9H_{10}N_2$	1-Ethylindazole....	146 09		120^{15}	1 064	878
3123	$C_9H_{10}O_3$	2-Acetamino-4-nitrotoluene	194 09	96			
3124	$C_9H_{10}O$	Anol p-$(CH_3CH:CH)C_6H_4OH$	134 08	93	250 d.		
3125	$C_9H_{10}O$	Chavicol p-$(CH_2:CHCH_2)C_6H_4OH$	134 08	> -25	237	1 033^{18}	935
3126	$C_9H_{10}O$	Cinnamyl alcohol $C_6H_5CH.CHCH_2OH$	134 08	33	258 5	1 044	1039
3127	$C_9H_{10}O$	Allyl phenyl ether $C_3H_5OC_6H_5$	134 08		192		
3128	$C_9H_{10}O$	Methyl styryl ether	134 08		213	1 001	877
3129	$C_9H_{10}O$	2, 4-Dimethylbenzaldehyde	134 08	-8	216		
3130	$C_9H_{10}O$	Hydrocinnamaldehyde .	134 08	47	280		
3131	$C_9H_{10}O$	o-Xylene-4-aldehyde . .	134 08		225		
3132	$C_9H_{10}O$	Ethyl phenyl ketone $C_2H_5COC_6H_5$	134 08	21	218	1 010	689
3133	$C_9H_{10}O$	Methyl benzyl ketone $CH_3COCH_2C_6H_5$	134 08	-15 4	216 7	1 028	
3134	$C_9H_{10}O$	p-Methylacetophenone (Melilot)	134 08		222	1 013^{15}	703
3135	$C_9H_{10}O$	Chromane	134 08		95^{12}	1 064	
3135 1	$C_9H_{10}OS$	Ethyl thiobenzoate.	166 14		253^{763}	1 094^{25}	
3136	$C_9H_{10}O_2$	o-Coumaral alcohol	150 08	119			
3137	$C_9H_{10}O_2$	Hesperetol.........	150 08	57			
3138	$C_9H_{10}O_2$	2, 3-Dimethylbenzoic acid	150 08	144			
3139	$C_9H_{10}O_2$	2, 4-Dimethylbenzoic acid	150 08	126	268		
3140	$C_9H_{10}O_2$	2, 5-Dimethylbenzoic acid	150 08	132	268	1 069	
3141	$C_9H_{10}O_2$	2, 6-Dimethylbenzoic acid	150 08	116			
3142	$C_9H_{10}O_2$	3, 4-Dimethylbenzoic acid	150 08	165			
3143	$C_9H_{10}O_2$	o-Ethylbenzoic acid .	150 08	68			
3144	$C_9H_{10}O_2$	m-Ethylbenzoic acid.	150 08	47		1 042$^{100}_{4}$	1148
3145	$C_9H_{10}O_2$	p-Ethylbenzoic acid .	150 08	113			
3146	$C_9H_{10}O_2$	Hydratropic acid $C_2H_4(C_6H_5)CO_2H$	150 08		265		
3147	$C_9H_{10}O_2$	Hydrocinnamic acid .	150 08	48 6	279 8	1 071$^{48\ 7}_{0}$	
3148	$C_9H_{10}O_2$	Mesitylinic acid 3, 5-$(CH_3)_2C_6H_3CO_2H$	150 08	166			
3149	$C_9H_{10}O_2$	Benzyl acetate $CH_3CO_2CH_2C_6H_5$. .	150 08	-51 5	213 5	1 058	673
3150	$C_9H_{10}O_2$	o-Cresyl acetate o-$CH_3CO_2C_6H_4CH_3$.	150 08		208		
3151	$C_9H_{10}O_2$	m-Cresyl acetate m-$CH_3CO_2C_6H_4CH_3$	150 08		212		
3152	$C_9H_{10}O_2$	p-Cresyl acetate p-$CH_3CO_2C_6H_4CH_3$	150 08		212 5	1.050	599
3154	$C_9H_{10}O_2$	Ethyl benzoate $C_6H_5CO_2C_2H_5$......	150 08	-34 6	213 2	1 047	628
3155	$C_9H_{10}O_2$	Methyl phenylacetate.......... .	150 08		220	1 044^{16}	
3156	$C_9H_{10}O_2$	Methyl p-toluate p-$CH_3C_6H_4CO_2CH_3$	150 08	33	217		
3157	$C_9H_{10}O_2$	Phenyl propionate $C_2H_5CO_2C_6H_5$...	150 08	20	211	1 054$^{15}_{15}$	
3158	$C_9H_{10}O_3$	Acetovanillone...............	166 08	115	300		
3159	$C_9H_{10}O_3$	Paeonol 4, 2-$CH_3O(OH)C_6H_3COCH_3$	166 08	50			
3160	$C_9H_{10}O_3$	o-Ethoxybenzoic acid . .	166 08	22			
3161	$C_9H_{10}O_3$	m-Ethoxybenzoic acid	166 08	137			
3162	$C_9H_{10}O_3$	p-Ethoxybenzoic acid.	166 08	195			
3163	$C_9H_{10}O_3$	dl-Atrolactic acid	166 08	91			
3164	$C_9H_{10}O_3$	m-Hydrocoumaric acid	166 08	111			
3165	$C_9H_{10}O_3$	Melilotic acid. .	166 08	83			
3166	$C_9H_{10}O_3$	$d(l)$-2-Phenyllactic acid	166 08	125			
3167	$C_9H_{10}O_3$	Phloretic acid $HOC_6H_4CH(CH_3)CO_2H$	166 08	129			
3168	$C_9H_{10}O_3$	$d(l)$-Tropic acid.......	166 08	128			
3169	$C_9H_{10}O_3$	dl-Tropic acid..... .. .	166 08	123			
3169.1	$C_9H_{10}O_3$	Anisyl acetate p-$CH_3OC_6H_4O_2CCH_3$.	166 08		139^{12}	1.101	
3170	$C_9H_{10}O_3$	Ethyl salicylate $OHC_6H_4CO_2C_2H_5$.	166 08	1 3	231 5	1 131	670
3171	$C_9H_{10}O_3$	Guaiacyl acetate (Eucol).	166 08		240	1.138	
3172	$C_9H_{10}O_3$	Methyl anisate p-$CH_3OC_6H_4CO_2CH_3$.	166 08	48	256		
3173	$C_9H_{10}O_3$	Methyl o-cresotinate..	166 08	30	235		
3174	$C_9H_{10}O_3$	Methyl p-cresotinate	166 08		242		
3175	$C_9H_{10}O_3$	Methyl dl-mandelate .	166 08	58	144^{20}		
3176	$C_9H_{10}O_4$	Hydrocaffeic acid.... .	182 08	139			
3177	$C_9H_{10}O_4$	$d(l)$-Phenylglyceric acid ..	182 08	164			
3178	$C_9H_{10}O_4$	dl-Phenylglyceric acid . .	182 08	141		1.451	
3179	$C_9H_{10}O_4$	$d(l)$-p-Methoxymandelic acid . ..	182 08	105		1.354	
3181	$C_9H_{10}O_4$	Veratric acid 3, 4-$(CH_3O)_2C_6H_3CO_2H$.	182 08	181			
3182	$C_9H_{10}O_4$	Methoxymethyl salicylate.............	182.08		162^{42}	1.200^{15}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3183	$C_9H_{10}O_4$	Methyl vanillate	182.08	63	287		
3184	$C_9H_{10}O_4$	Glycol salicylate (Spirosal)	182.08		170^{12}		
3185	$C_9H_{10}O_5$	Syringic acid	198.08	245			
3186	$C_9H_{10}O_5$	Ethyl gallate	198.08	160			
3187	$C_9H_{10}O_6$	2, 3, 4, 5-Dimethoxydihydroxybenzoic acid	214.08	148			
3187.1	$C_9H_{10}S_2$	Ethyl dithiobenzoate	182 21		180^{28}	1.1439^{25}	
3188	$C_9H_{11}N$	Allyl aniline $C_6H_5NHCH_2CH{:}CH_2$	133 09		209	0.982^{25}	
3189	$C_9H_{11}N$	Benzylideneethylamine	133 09		195.4		
3190	$C_9H_{11}N$	Styrylamine $C_6H_5CH\,CHCH_2NH_2$	133 09		237		
3191	$C_9H_{11}N$	1, 2, 3, 4-Tetrahydroisoquinoline	133 09		233	1.064	1012
3192	$C_9H_{11}N$	1, 2, 3, 4-Tetrahydroquinoline	133 09	20	251	1.055	1013
3193	$C_9H_{11}NO$	*p*-Dimethylaminobenzaldehyde	149 09	75			
3194	$C_9H_{11}NO$	*o*-Acetotoluide *o*-$CH_3CONHC_6H_4CH_3$	149 09	110	296		1255
3195	$C_9H_{11}NO$	*m*-Acetotoluide *m*-$CH_3CONHC_6H_4CH_3$	149 09	65 5	303		
3196	$C_9H_{11}NO$	*p*-Acetotoluide *p*-$CH_3CONHC_6H_4CH_3$	149 09	153	307		1276
3197	$C_9H_{11}NO$	*N*-Benzylacetamide $CH_3CONHC_7H_7$	149 09	61	300		
3198	$C_9H_{11}NO$	*N*-Ethylbenzamide $C_6H_5CONHC_2H_5$	149 09	71	290		
3199	$C_9H_{11}NO$	*N*-Methylacetanilide (Exalgin)	149 09	102	254.7		1250
3200	$C_9H_{11}NO$	Propionanilide $C_2H_5CONHC_6H_5$	149 09	104			
3201	$C_9H_{11}NOS$	*N*-Phenylthiourethane	181.16	69			
3202	$C_9H_{11}NO_2$	4-Acetylamino-2-hydroxytoluene	165 09	225			
3203	$C_9H_{11}NO_2$	3-Acetylamino-4-hydroxytoluene	165 09	160			
3204	$C_9H_{11}NO_2$	*p*-Acetylmethylaminophenol	165 09	240			
3205	$C_9H_{11}NO_2$	1-Anilinopropionic acid	165 09	162			
3206	$C_9H_{11}NO_2$	*o*-Dimethylanthranilic acid	165 09	175			
3207	$C_9H_{11}NO_2$	*m*-Ethylaminobenzoic acid	165.09	101			
3208	$C_9H_{11}NO_2$	*l*-Phenylalanine	165 09	283 d.			1260
3209	$C_9H_{11}NO_2$	*dl*-Phenylalanine	165 09	265 d.			
3210	$C_9H_{11}NO_2$	*o*-Tolylaminoacetic acid	165 09	150			
3211	$C_9H_{11}NO_2$	*p*-Tolylaminoacetic acid	165 09	118			
3212	$C_9H_{11}NO_2$	2, 4, 6-Trimethylpyridine-3-carboxylic acid	165.09		155		
3213	$C_9H_{11}NO_2$	Ethyl *p*-aminobenzoate	165 09	91			
3214	$C_9H_{11}NO_2$	Ethyl anthranilate	165.09		260		
3216	$C_9H_{11}NO_2$	*o*-Acetanisde *o*-$CH_3OC_6H_4NHCOCH_3$	165 09	84	305		
3217	$C_9H_{11}NO_2$	*p*-Acetanisde $CH_3CONHC_6H_4OCH_3$	165 09	127			
3218	$C_9H_{11}NO_2$	*p*-Formylphenetidine	165 09	60			
3219	$C_9H_{11}NO_2$	Nitrocumene $(CH_3)_2CHC_6H_4NO_2$	165.09	−35	224 d.		
3220	$C_9H_{11}NO_2$	Nitromesitylene	165 09	44	255		
3221	$C_9H_{11}NO_2$	*N*-Phenylurethane $C_2H_5CO_2NHC_6H_5$	165 09	52	238		
3222	$C_9H_{11}NO_3$	*l*-Tyrosine	181 09	295 d.		1.456	1259
3223	C_9H_{12}	Cumene $(CH_3)_2CHC_6H_5$	120.09		153 4	0.864	561
3224	C_9H_{12}	*o*-Ethyltoluene *o*-$C_2H_5C_6H_4CH_3$	120 09	> −17	162	0.882	615
3225	C_9H_{12}	*m*-Ethyltoluene *m*-$C_2H_5C_6H_4CH_3$	120 09		162.5	0.867	585
3226	C_9H_{12}	*p*-Ethyltoluene *p*-$C_2H_5C_6H_4CH_3$	120 09	< −20	162	0 862	568
3227	C_9H_{12}	Hemimellitene 1, 2, 3-$(CH_3)_3C_6H_3$	120.09		176 5	0.895	650
3228	C_9H_{12}	Mesitylene 1, 3, 5-$(CH_3)_3C_6H_3$	120.09	−52.7	164 6	0.863	580
3229	C_9H_{12}	*n*-Propylbenzene $CH_3(CH_2)_2C_6H_5$	120.09	−101.6	157.5	0.862	556
3230	C_9H_{12}	Pseudocumene 1, 2, 4-$(CH_3)_3C_6H_3$	120.09	−61.0	169.8	0.87	622
3231	$C_9H_{12}N_2O$	1-Ethyl-2-phenylurea	164 11	99			
3232	$C_9H_{12}N_2O_2$	*p*-Phenetylurea $C_2H_5OC_6H_4NHCONH_2$	180.11	173			
3233	$C_9H_{12}N_2O_2$	Pilosinine	180.11	79	300^{25}		
3234	$C_9H_{12}N_4O_3$	1, 3, 7, 9-Tetramethyluric acid	224 12	228	d.		1268
3235	$C_9H_{12}O$	Benzylmethyl carbinol	136 09		212	0.994	
3235.1	$C_9H_{12}O$	*d*-Benzylmethyl carbinol	136 09		125^{25}	0 991	660
3236	$C_9H_{12}O$	Ethylphenyl carbinol	136 09		219	0.996	
3237	$C_9H_{12}O$	Hydrocinnamyl alcohol	136 09	< −18	237.4	1.008	706
3238	$C_9H_{12}O$	Mesitol 2, 4, 6-$(CH_3)_3C_6H_2OH$	136 09	69	220		
3239	$C_9H_{12}O$	*o*-*n*-Propylphenol *o*-$C_3H_7C_6H_4OH$	136 09		226.6	1.015^0	
3240	$C_9H_{12}O$	*m*-*n*-Propylphenol *m*-$C_3H_7C_6H_4OH$	136.09	26	228		
3241	$C_9H_{12}O$	*p*-*n*-Propylphenol *p*-$C_3H_7C_6H_4OH$	136.09	61	232.6	1.009^0	
3242	$C_9H_{12}O$	Pseudocumenol 2, 4, 5-$(CH_3)_3C_6H_2OH$	136.09	72	235		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3243	$C_9H_{12}O$	Ethyl benzyl ether $C_2H_5OC_7H_7$	136 09		226	$0.998^{17.4}$	
3244	$C_9H_{12}O$	Ethyl *m*-cresyl ether	136 09		192	0.949	648
3245	$C_9H_{12}O$	Ethyl *p*-cresyl ether *p*-$CH_3C_6H_4OC_2H_5$	136 09		189 9	0.874^0	928
3246	$C_9H_{12}O$	Propyl phenyl ether $C_3H_7OC_6H_5$	136 09		190 5	0 968	
3247	$C_9H_{12}O$	Isopropyl phenyl ether	136 09		177 2	0.946^{15}_{15}	
3248	$C_9H_{12}O_2$	Mesorcinol	152 09	150	275 5		
3249	$C_9H_{12}O_2$	Guaiacyl ethyl ether	152 09		213		
3250	$C_9H_{12}O_3$	Phloroglucinol trimethyl ether	168 09	52	255 5		
3251	$C_9H_{12}O_3$	Pyrogallol trimethyl ether	168 09	47	241	$1\ 099^{75}_{75}$	
3252	$C_9H_{12}O_3$	Metacrolein $(C_3H_4O)_3$	168 09	46			
3253	$C_9H_{12}O_3$	Caryophyllenic acid	168 09			1.140	
3254	$C_9H_{12}O_3S$	Mesitylenesulfonic acid	200 16	77			
3255	$C_9H_{12}O_3S$	Toluene *p*-ethylsulfonate	200 16	33	173^{15}	$1\ 174^{33}$	
3256	$C_9H_{12}O_5$	Anhydrocamphoronic acid	200 09	133			
3257	$C_9H_{13}N$	Cumidine *p*-$(CH_3)_2CHC_6H_4NH_2$	135 11	63	225	0.957	1333
3258	$C_9H_{13}N$	Dimethyl-*o*-toluidine	135 11	−61 0	184 6	0.929	682
3259	$C_9H_{13}N$	Dimethyl-*m*-toluidine	135 11		212 5	0 941	733
3260	$C_9H_{13}N$	Dimethyl-*p*-toluidine	135 11		211 5	0 937	726
3261	$C_9H_{13}N$	Ethyl-*o*-toluidine	135 11		214	$0.953^{15.5}$	
3262	$C_9H_{13}N$	Ethyl-*m*-toluidine	135 11		222		
3263	$C_9H_{13}N$	Ethyl-*p*-toluidine	135 11		217	0 939	
3264	$C_9H_{13}N$	Mesidine 1, 3, 5-$(CH_3)_3C_6H_2NH_2$	135 11		233	0.963	
3265	$C_9H_{13}N$	ω-Mesitylamine	135.11		218 2	0 950	699
3266	$C_9H_{13}N$	Parvoline	135 11		234		
3267	$C_9H_{13}N$	*n*-Propylaniline $C_6H_5NHC_3H_7$	135 11		222	$0\ 949^{16}$	
3268	$C_9H_{13}N$	Isopropylaniline $C_6H_5NHCH(CH_3)_2$	135 11		213		
3269	$C_9H_{13}N$	Pseudocumidine	135 11	66	235		
3270	$C_9H_{13}NO_2$	Anhydroecgonine	167 11	235 d.			
3271	$C_9H_{13}NO_3$	Adrenaline	183 11	207 d.			
3272	C_9H_{14}	Apocyclene	122 11	43	138 9	0.871^{40}_4	1056
3273	C_9H_{14}	Santene	122 11		142	0.869^{15}	486
3274	$C_9H_{14}ClNO_2$	Anhydroecgonine hydrochloride	203 57	241			
3275	$C_9H_{14}N_2O_3$	Ethylpropylbarbituric acid	198 12	146			
3276	$C_9H_{14}O$	Nopinone	138 11	0	209		
3277	$C_9H_{14}O$	Phorone	138 11	28	198 5	0 885	598
3278	$C_9H_{14}O_2$	Lauronolic acid	154 11		$129^{11.5}$		
3279	$C_9H_{14}O_2$	Methyl amylpropiolate	154 11		111^{18}	$0\ 991^{15}_{15}$	
3280	$C_9H_{14}O_3$	Castelamarin	170 11	269			
3281	$C_9H_{14}O_4$	*cis*-Hexahydrohomophthalic acid	186 11	146			
3282	$C_9H_{14}O_4$	*trans*-Hexahydrohomophthalic acid	186.11	157			
3282.1	$C_9H_{14}O_4$	*dl*-Pinic acid	186.11	102 5	216^{10}	$1\ 093^{109.4}$	1154
3282 2	$C_9H_{14}O_4$	*d*-Pinic acid	186 11	136	216^{10}		
3283	$C_9H_{14}O_4$	Diethyl citraconate	186 11		230.3	1.062	847
3284	$C_9H_{14}O_4$	Diethyl glutaconate	186 11		238	1 050	
3285	$C_9H_{14}O_4$	Diethyl itaconate	186 11		227.9	1 045	369
3286	$C_9H_{14}O_4$	Diethyl mesaconate	186 11		229	1.047	594
3287	$C_9H_{14}O_5$	4-Ketoazelaic acid	202 11	102; 109			
3288	$C_9H_{14}O_6$	*l*-Camphoronic acid	218.11	165			
3289	$C_9H_{14}O_6$	Glycerol triacetate	218 11		259	1.161	326
3290	$C_9H_{14}O_7$	Trimethyl citrate	234 11	79	287 d.		
3291	$C_9H_{15}NO$	Pseudopelletierine	153 12	49	246	$1\ 001^{99.5}$	1138
3292	$C_9H_{15}NO_3$	*d*-Ecgonine	185 12	257			
3293	$C_9H_{15}NO_3$	*l*-Ecgonine	185.12	198 d.		1.370^{12}_4	
3294	$C_9H_{15}NO_3$	*dl*-Ecgonine	185.12	212			
3294 1	$C_9H_{15}N_3O_2S$	Ergothioneine	229 21	290			
3295	C_9H_{16}	Campholene	124 12	> −20	133	0.803	399
3296	C_9H_{16}	Nopinane	124 12		149 5	0.861^{22}_{22}	479
3297	C_9H_{16}	Pulegene	124.12		139	0.791^{22}	979
3298	$C_9H_{16}ClNO_3$	*l*-Ecgonine hydrochloride	221.59	246			
3299	$C_9H_{16}N_2O_5S_3$	Cheiroline	328.33	48	200 d.		
3300	$C_9H_{16}O$	Camphorol	140.12		81^{16}		
3301	$C_9H_{16}O$	α-Nopinol	140 12	102	205		
3302	$C_9H_{16}O$	*dl*-Santenol	140.12	98	196	0.987	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
3303	$C_9H_{16}O_2$	Amyl *l*-α-crotonate	156.12			0.896	360
3304	$C_9H_{16}O_2$	Ethyl hexahydrobenzoate	156.12		196.5	0.967^{15}_{4}	886
3305	$C_9H_{16}O_2$	Methyl cyclohexylacetate	156.12		202	0.990^{14}_{0}	
3306	$C_9H_{16}O_3$	Ethyl isopropylacetoacetate	172.12		205 d.	0.960^{25}_{25}	
3307	$C_9H_{16}O_4$	Azelaic acid $HO_2C(CH_2)_7CO_2H$	188.12	106.5	360	1.029	1155
3308	$C_9H_{16}O_4$	*n*-Butyl ethyl malonate	188.12		130^{12}	0.976^{25}_{25}	284
3309	$C_9H_{16}O_4$	Isobutyl ethyl malonate	188.12		120^{8}	0.968^{25}_{25}	286
3310	$C_9H_{16}O_4$	*sec.*-Butyl ethyl malonate	188.12		160^{60}	0.986^{25}_{25}	310
3311	$C_9H_{16}O_4$	Diethyl dimethylmalonate	188.12		196	0.995	196
3312	$C_9H_{16}O_4$	Diethyl glutarate $CH_2(CH_2COC_2H_5)_2$	188.12		237	1.025	
3313	$C_9H_{16}O_4$	Dipropyl malonate $CH_2(CO_2C_3H_7)_2$	188.12		228.3	1.027^{0}_{0}	
3314	$C_9H_{16}O_4$	Propyl isopropyl malonate	188.12		143^{42}	0.980^{25}_{25}	293
3314.1	$C_9H_{17}BrO$	*l*-Amyl bromobutyrate	221.05		105^{11}	1.196^{25}	
3315	$C_9H_{17}NO$	Homotropine	155.14	85			
3316	$C_9H_{17}NO$	Methylpelletierine	155.14		215		
3317	$C_9H_{17}NO$	Triacetoneamine	155.14	39.6			
3318	C_9H_{18}	Cyclononane	126.14		172	0.773^{16}_{4}	
3319	C_9H_{18}	Ethylcycloheptane $C_2H_5C_7H_{13}$.	126.14	<-30	199	0.952	
3320	C_9H_{18}	Hexahydrocumene $(CH_3)_2CHC_6H_{11}$	126.14		150	0.787	
3321	C_9H_{18}	2-Methyl-1-octene $C_6H_{13}C(CH_3):CH_2$	126.14		143		
3322	C_9H_{18}	Nonylene $C_6H_{13}CH.CHCH_3$	126.14		149.9	0.754^{15}_{15}	
3323	C_9H_{18}	Propylcyclohexane $C_3H_7C_6H_{11}$	126.14		149.5	0.767	
3324	$C_9H_{18}O$	*dl*-Pulenol	142.14		187.5	0.908	902
3325	$C_9H_{18}O$	Pelargonic aldehyde $CH_3(CH_2)_7CHO$.	142.14		93.5^{23}	0.828^{15}	280
3326	$C_9H_{18}O$	Diisobutyl ketone $[(CH_3)_2CHCH_2]_2CO$	142.14		182	0.833	
3327	$C_9H_{18}O$	Isopropyl isoamyl ketone	142.14		172		
3328	$C_9H_{18}O_2$	Pelargonic acid $CH_3(CH_2)_7CO_2H$.	158.14	12	254	0.907	340
3329	$C_9H_{18}O_2$	Amyl *n*-butyrate $C_4H_9CO_2C_5H_{11}$	158.14		184.8	0.883^{0}_{0}	184
3330	$C_9H_{18}O_2$	Isoamyl *n*-butyrate	158.14		178.6	0.882^{0}_{4}	
3330.1	$C_9H_{18}O_2$	*d*-β-Amyl *n*-butyrate	158.14		71^{16}	0.869	161
3331	$C_9H_{18}O_2$	Amyl isobutyrate $(CH_3)_2CHCO_2C_5H_{11}$	158.14		155	0.859	167
3332	$C_9H_{18}O_2$	Butyl *n*-valerate $C_4H_9CO_2C_4H_9$	158.14		185.8	0.885^{0}	
3333	$C_9H_{18}O_2$	Isobutyl *n*-valerate	158.14		167	0.854	
3333.1	$C_9H_{18}O_2$	*d*-*sec.*-Butyl valerate	158.14		67^{18}	0.860	164
3334	$C_9H_{18}O_2$	Isobutyl isovalerate	158.14		168.5	0.854	162
3335	$C_9H_{18}O_2$	Ethyl *n*-heptylate $C_6H_{13}CO_2C_2H_5$	158.14		187.1	0.872^{15}_{4}	195
3336	$C_9H_{18}O_2$	*n*-Heptyl acetate $CH_3CO_2C_7H_{15}$	158.14		191.5	0.874^{16}_{16}	221
3337	$C_9H_{18}O_2$	Methyl caprylate $C_7H_{15}CO_2CH_3$	158.14	-41	192.9	0.887	
3338	$C_9H_{18}O_2$	*d*-β-Octylformate	158.14		82^{20}	$0.872^{12.5}$	209
3339	$C_9H_{18}O_2$	Propyl caproate $C_5H_{11}CO_2C_3H_7$	158.14		185.5	0.884^{0}_{0}	
3340	$C_9H_{18}O_3$	Parapropionaldehyde $(C_3H_6O)_3$	174.14		170		
3341	$C_9H_{18}O_3$	Di-*n*-butyl carbonate $((C_4H_9O)_2CO$	174.14		207.7	0.924	
3342	$C_9H_{18}O_3$	Diisobutyl carbonate	174.14		190.3	0.919^{15}	
3343	$C_9H_{18}O_4$	1, 2-Dihydroxypelargonic acid	190.14	123			
3344	$C_9H_{18}O_7$	Galactite	238.14		142		1214
3345	$C_9H_{19}N$	*l*-1-Methylconiine	141.15		175.5	0.832^{24}	
3346	$C_9H_{19}NO$	*N*-Diethyl-*n*-valeramide	157.15		210		
3347	C_9H_{20}	2, 4-Dimethylheptane	128.15		133.3	0.716	143
3348	C_9H_{20}	*d*-2, 5-Dimethylheptane	128.15		137	0.715^{16}	
3349	C_9H_{20}	*dl*-2, 5-Dimethylheptane	128.15		135.9	0.719^{15}_{15}	144
3350	C_9H_{20}	2, 6-Dimethylheptane	128.15		132.0	0.712^{15}_{15}	
3351	C_9H_{20}	4-Ethylheptane $(C_3H_7)_2CHC_2H_5$	128.15		139	0.741	170
3352	C_9H_{20}	*d*-3-Methyloctane	128.15		143.4	0.721^{17}	
3353	C_9H_{20}	4-Methyloctane $C_3H_7(CH_3)CHC_4H_9$.	128.15		141.6	0.732^{15}_{15}	147
3354	C_9H_{20}	*n*-Nonane $CH_3(CH_2)_7CH_3$	128.15	-51	150.6	0.718	151
3355	$C_9H_{20}O$	Butyl-*sec.*-butyl carbinol	144.15		180	0.834	335
3356	$C_9H_{20}O$	Dibutyl carbinol $(C_4H_9)_2CHOH$	144.15		194	0.823	320
3357	$C_9H_{20}O$	Diisobutyl carbinol	144.15		174.3	0.816^{12}_{4}	271
3358	$C_9H_{20}O$	Di-*sec.*-butyl carbinol	144.15		171	0.836	338
3359	$C_9H_{20}O$	Diethylisobutyl carbinol	144.15		172		
3360	$C_9H_{20}O$	4, 6-Dimethylheptane-2-ol	144.15		195	0.879^{0}	
3361	$C_9H_{20}O$	Methylethylisoamyl carbinol	144.15		175	0.829	329
3362	$C_9H_{20}O$	Methylethyl-*tert.*-amyl carbinol	144.15		166	0.832	348

No.	Formula	Name	Mol. wt.	M P	B. P.	*d*	R. I. No.
3363	$C_9H_{20}O$	Methylpropylisobutyl carbinol	144.15		171.3	0.826	330
3364	$C_9H_{20}O$	*n*-Nonyl alcohol $CH_3(CH_2)_8OH$	144.15	−5	215	0.828	344
3365	$C_9H_{20}O$	Isobutyl-*d*-amyl ether	144.15		148.2	0.773	125
3366	$C_9H_{20}O$	Ethyl *n*-heptyl ether $C_2H_5OC_7H_{15}$	144.15		166.6	0.790^{16}	
3367	$C_9H_{20}O$	Methyl *n*-octyl ether $CH_3OC_8H_{17}$	144.15		173	0.802_0^4	
3368	$C_9H_{20}O_2$	Propylidene dipropyl ether	136.15		166.2	0.849^0	
3369	$C_9H_{20}O_4$	Ethyl orthocarbonate $C(OC_2H_5)_4$	192.15		159	0.917	90
3370	$C_9H_{20}O_4S_2$	Tetronal $(C_2H_5)_2C(SO_2C_2H_5)_2$	256.28	85			
3371	$C_9H_{21}N$	*n*-Nonylamine $C_9H_{19}NH_2$	143.17		195		
3372	$C_9H_{21}N$	Tri-*n*-propylamine $(C_3H_7)_3N$	143.17	−93.5	156	0.757	230
3373	$C_{10}H_2Cl_6$	Hexachloronaphthalene	334.76	143			
3374	$C_{10}H_4Cl_4$	α-Tetrachloronaphthalene	265.86	130			
3375	$C_{10}H_4Cl_4$	β-Tetrachloronaphthalene	265.86	194			
3376	$C_{10}H_4Cl_4$	γ-Tetrachloronaphthalene	265.86	176			
3377	$C_{10}H_4Cl_4$	δ-Tetrachloronaphthalene	265.86	141			
3378	$C_{10}H_4Cl_4$	ε-Tetrachloronaphthalene	265.86	180			
3379	$C_{10}H_4Cl_4$	ζ-Tetrachloronaphthalene	265.86	160.5			
3380	$C_{10}H_4Cl_4$	*vic.*-Tetrachloronaphthalene	265.86	140			
3381	$C_{10}H_4N_4O_8$	α-Tetranitronaphthalene	308.06	259	exp.		
3382	$C_{10}H_4N_4O_8$	1, 2, 5, 8-Tetranitronaphthalene	308.06	270 d.			
3383	$C_{10}H_4N_4O_8$	1, 2, 6, 8-Tetranitronaphthalene	308.06	<300			
3384	$C_{10}H_4N_4O_8$	1, 3, 5, 8-Tetranitronaphthalene	308.06	195			
3385	$C_{10}H_4N_4O_8$	1, 3, 6, 8-Tetranitronaphthalene	308.06	203	exp.		
3386	$C_{10}H_4N_4O_9$	2, 4, 5, 7-Tetranitro-α-naphthol	324.06	180			
3387	$C_{10}H_5Cl_3$	1, 2, 3-Trichloronaphthalene	231.41	81			
3388	$C_{10}H_5Cl_3$	1, 2, 4-Trichloronaphthalene	231.41	92			
3389	$C_{10}H_5Cl_3$	1, 2, 5-Trichloronaphthalene	231.41	78			
3390	$C_{10}H_5Cl_3$	1, 2, 6-Trichloronaphthalene	231.41	97			
3391	$C_{10}H_5Cl_3$	1, 2, 7-Trichloronaphthalene	231.41	88			
3392	$C_{10}H_5Cl_3$	1, 2, 8-Trichloronaphthalene	231.41	83.5			
3393	$C_{10}H_5Cl_3$	1, 3, 5-Trichloronaphthalene	231.41	103			
3394	$C_{10}H_5Cl_3$	1, 3, 6-Trichloronaphthalene	231.41	80.5			
3395	$C_{10}H_5Cl_3$	1, 3, 7-Trichloronaphthalene	231.41	113			
3396	$C_{10}H_5Cl_3$	1, 3, 8-Trichloronaphthalene	231.41	89.5			
3397	$C_{10}H_5Cl_3$	1, 4, 5-Trichloronaphthalene	231.41	131			
3398	$C_{10}H_5Cl_3$	1, 4, 6-Trichloronaphthalene	231.41	66			
3399	$C_{10}H_5Cl_3$	1, 6, 7-Trichloronaphthalene	231.41	109.5			
3400	$C_{10}H_5Cl_3$	2, 3, 6-Trichloronaphthalene	231.41	91			
3401	$C_{10}H_5Cl_3$	2, 3, 7-Trichloronaphthalene	231.41	90			
3402	$C_{10}H_5NO_{10}$	Pyridinepentacarboxylic acid	299.05	220 d.			
3403	$C_{10}H_5N_3O_6$	1, 2, 5-Trinitronaphthalene	263.06	113			
3404	$C_{10}H_5N_3O_6$	1, 3, 5-Trinitronaphthalene	263.06	123			
3405	$C_{10}H_5N_3O_6$	1, 3, 8-Trinitronaphthalene	263.06	218			
3406	$C_{10}H_5N_3O_6$	1, 4, 5-Trinitronaphthalene	263.06	247			
3407	$C_{10}H_5N_3O_7$	2, 4, 5-Trinitro-α-naphthol	279.06	189.5			
3408	$C_{10}H_5N_3O_7$	2, 4, 7-Trinitro-α-naphthol	279.06	145			
3409	$C_{10}H_5N_3O_7$	2, 4, 8-Trinitro-α-naphthol .	279.06	175			
3410	$C_{10}H_6ClNO_2$	4-Chloro-1-nitronaphthalene	207.51	84			
3411	$C_{10}H_6ClNO_2$	7-Chloro-1-nitronaphthalene	207.51	116			
3412	$C_{10}H_6Cl_2$	1, 2-Dichloronaphthalene	196.96	37	282	$1.315_4^{48.5}$	1076
3413	$C_{10}H_6Cl_2$	1, 3-Dichloronaphthalene	196.96	61	289		
3414	$C_{10}H_6Cl_2$	1, 4-Dichloronaphthalene	196.96	68	287.6	1.300_4^{76}	1104
3415	$C_{10}H_6Cl_2$	1, 5-Dichloronaphthalene	196.96	107			
3416	$C_{10}H_6Cl_2$	1, 6-Dichloronaphthalene	196.96	48			
3417	$C_{10}H_6Cl_2$	1, 7-Dichloronaphthalene	196.96	62	286	1.261_4^{100}	1149
3418	$C_{10}H_6Cl_2$	1, 8-Dichloronaphthalene	196.96	88	d.	1.292_4^{100}	1150
3419	$C_{10}H_6Cl_2$	2, 3-Dichloronaphthalene	196.96	120			
3420	$C_{10}H_6Cl_2$	2, 6-Dichloronaphthalene	196.96	135	285		
3421	$C_{10}H_6Cl_2$	2, 7-Dichloronaphthalene	196.96	114			
3422	$C_{10}H_6Cl_2O$	2, 3-Dichloro-α-naphthol.	212.96	101			
3423	$C_{10}H_6Cl_2O$	2, 4-Dichloro-α-naphthol .	212.96	108			
3424	$C_{10}H_6Cl_2O$	5, 7-Dichloro-α-naphthol	212.96	132			
3425	$C_{10}H_6Cl_2O$	5, 8-Dichloro-α-naphthol .	212.96	115			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
3426	$C_{10}H_6Cl_2O$	6, 7-Dichloro-α-naphthol	212.96	151			
3427	$C_{10}H_6Cl_2O$	7, 8-Dichloro-α-naphthol	212.96	95			
3428	$C_{10}H_6Cl_2O$	1, 3-Dichloro-β-naphthol	212.96	81			
3429	$C_{10}H_6Cl_2O$	1, 4-Dichloro-β-naphthol	212.96	124			
3429 1	$C_{10}H_6Cl_2O$	3, 6-(6, 8)-Dichloro-β-naphthol	212.96	125			
3430	$C_{10}H_6Cl_2O_4S_2$	Naphthalene-1, 5-disulfonechloride	325.09	183			
3431	$C_{10}H_6Cl_2O_4S_2$	Naphthalene-1, 6-disulfonechloride	325.09	129			
3432	$C_{10}H_6Cl_2O_4S_2$	Naphthalene-2, 6-disulfonechloride	325.09	226			
3433	$C_{10}H_6Cl_2O_4S_2$	Naphthalene-2, 7-disulfonechloride	325.09	162			
3434	$C_{10}H_6N_2O_2$	Pyrocoll	186.06	269			
3435	$C_{10}H_6N_2O_4$	1, 2-Dinitronaphthalene	218.06	103			
3436	$C_{10}H_6N_2O_4$	1, 3-Dinitronaphthalene	218.06	145			
3437	$C_{10}H_6N_2O_4$	1, 4-Dinitronaphthalene	218.06	129			
3438	$C_{10}H_6N_2O_4$	1, 5-Dinitronaphthalene	218.06	216			
3439	$C_{10}H_6N_2O_4$	1, 6-Dinitronaphthalene	218.06	162			
3440	$C_{10}H_6N_2O_4$	1, 7-Dinitronaphthalene	218.06	156			
3441	$C_{10}H_6N_2O_4$	1, 8-Dinitronaphthalene	218.06	170			
3442	$C_{10}H_6N_2O_5$	2, 4-Dinitro-α-naphthol	234.06	138			
3443	$C_{10}H_6N_2O_5$	4, 5-Dinitro-α-naphthol	234.06	230 d.			
3444	$C_{10}H_6N_2O_5$	4, 8-Dinitro-α-naphthol	234.06	235 d.			
3445	$C_{10}H_6N_2O_5$	1, 6-Dinitro-β-naphthol	234.06	195			
3446	$C_{10}H_6N_2O_5$	1, 8-Dinitro-β-naphthol	234.06	198			
3447	$C_{10}H_6O_2$	1, 2-Naphthoquinone	158.05	120 d.			
3448	$C_{10}H_6O_2$	1, 4-Naphthoquinone	158.05	125			
3449	$C_{10}H_6O_2$	2, 6-Naphthoquinone	158.05	135			
3450	$C_{10}H_6O_8$	Mellophanic acid	254.05	238			
3451	$C_{10}H_6O_8$	Prehnitic acid	254.05	237 d.			
3452	$C_{10}H_6O_8$	Pyromellitic acid	254.05	264			
3453	$C_{10}H_7Br$	α-Bromonaphthalene	206.97	5	281.1	1.476	799
3454	$C_{10}H_7Br$	β-Bromonaphthalene	206.97	59	282	1.605^0	
3455	$C_{10}H_7Cl$	α-Chloronaphthalene	162.51		258	1.191	795
3456	$C_{10}H_7Cl$	β-Chloronaphthalene	162.51	56	264.3	$1.138_4^{70.7}$	1102
3457	$C_{10}H_7ClO$	2-Chloro-α-naphthol	178.51	70			
3458	$C_{10}H_7ClO$	4-Chloro-α-naphthol	178.51	117			
3459	$C_{10}H_7ClO$	5-Chloro-α-naphthol	178.51	131.5			
3460	$C_{10}H_7ClO$	6-Chloro-α-naphthol	178.51	94			
3461	$C_{10}H_7ClO$	7-Chloro-α-naphthol	178.51	123			
3462	$C_{10}H_7ClO$	1-Chloro-β-naphthol	178.51	71			
3463	$C_{10}H_7ClO$	5-Chloro-β-naphthol	178.51	128			
3464	$C_{10}H_7ClO$	6-Chloro-β-naphthol	178.51	115			
3465	$C_{10}H_7ClO$	7-Chloro-β-naphthol	178.51	126.5			
3466	$C_{10}H_7ClO$	8-Chloro-β-naphthol	178.51	101	308		
3467	$C_{10}H_7ClO_2S$	Naphthalene-1-sulfonechloride	226.58	68	195^{13}		
3468	$C_{10}H_7ClO_2S$	Naphthalene-2-sulfonechloride	226.58	76	201^{13}		
3469	$C_{10}H_7F$	α-Fluoronaphthalene	146.05		216.5	1.135^0	
3470	$C_{10}H_7F$	β-Fluoronaphthalene	146.05	59	212.5		
3471	$C_{10}H_7IO$	1-Iodo-β-naphthol	269.99	94.5			
3472	$C_{10}H_7NO$	Cinnamyl cyanide $C_6H_5CH:CH_2COCN$.	157.06	115			
3473	$C_{10}H_7NO_2$	α-Nitronaphthalene	173.06	58.8	304	1.331^4	
3474	$C_{10}H_7NO_2$	β-Nitronaphthalene	173.06	79	165^{15}		
3475	$C_{10}H_7NO_2$	2-Nitroso-α-naphthol	173.06	152			
3476	$C_{10}H_7NO_2$	4-Nitroso-α-naphthol	173.06	194			
3477	$C_{10}H_7NO_2$	1-Nitroso-β-naphthol	173.06	109.5			
3478	$C_{10}H_7NO_2$	Cinchoninic acid	173.06	254			
3479	$C_{10}H_7NO_2$	Quinaldinic acid	173.06	156			
3480	$C_{10}H_7NO_2$	Quinoline-3-carboxylic acid	173.06	275			
3481	$C_{10}H_7NO_2$	Quinoline-6-carboxylic acid	173.06	292			
3482	$C_{10}H_7NO_2$	Quinoline-7-carboxylic acid	173.06	249			
3483	$C_{10}H_7NO_2$	Quinoline-8-carboxylic acid	173.06	187.5			
3484	$C_{10}H_7NO_3$	α-Kynurenic acid	189.06	283			
3485	$C_{10}H_7NO_3$	2-Nitro-α-naphthol	189.06	128			
3486	$C_{10}H_7NO_3$	3-Nitro-α-naphthol	189.06	168			
3487	$C_{10}H_7NO_3$	4-Nitro-α-naphthol	189.06	164			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3488	$C_{10}H_7NO_3$	5-Nitro-α-naphthol	189.06	171			
3489	$C_{10}H_7NO_3$	1-Nitro-β-naphthol	189.06	103			
3490	$C_{10}H_7NO_3$	5-Nitro-β-naphthol	189.06	147			
3491	$C_{10}H_7NO_3$	6-Nitro-β-naphthol	189.06	158			
3492	$C_{10}H_7NO_3$	8-Nitro-β-naphthol	189.06	145			
3493	$C_{10}H_7NO_4$	Indoledicarboxylic acid	205.06	>250 d			
3494	$C_{10}H_8$	Naphthalene $C_{10}H_8$	128.06	80.1	217.9	1.145	1143
3495	$C_{10}H_8Cl_4$	Naphthalenetetrachloride	269.89	182			
3496	$C_{10}H_{10}IN$	Quinoline methiodide $C_9H_7N.CH_3I$	271.02	133			
3497	$C_{10}H_8N_2$	2, 3′-Dipyridyl	156.08		289		
3498	$C_{10}H_8N_2$	3, 3′-Dipyridyl	156.08	68	296.5	1.164	
3499	$C_{10}H_8N_2$	4, 4′-Dipyridyl	156.08	112	304.8		
3500	$C_{10}H_8N_2$	Nicotelline	156.08	148	<300		
3501	$C_{10}H_8N_2O_2$	3-Nitro-α-naphthylamine	188.08	137			
3502	$C_{10}H_8N_2O_2$	6-Nitro-α-naphthylamine	188.08	143			
3503	$C_{10}H_8N_2O_2$	7-Nitro-α-naphthylamine	188.08	122			
3504	$C_{10}H_8N_2O_2$	1-Nitro-β-naphthylamine	188.08	127			
3505	$C_{10}H_8N_2O_2$	5-Nitro-β-naphthylamine	188.08	143			
3506	$C_{10}H_8N_2O_2$	8-Nitro-β-naphthylamine	188.08	105			
3507	$C_{10}H_8O$	α-Naphthol $C_{10}H_7OH$	144.06	96	280	$1.099^{99.3}$	1126
3508	$C_{10}H_8O$	β-Naphthol $C_{10}H_7OH$	144.06	122	286	1.217^{4}	1333
3509	$C_{10}H_8O_2$	1, 2-Dihydroxynaphthalene	160.06	60			
3510	$C_{10}H_8O_2$	1, 3-Dihydroxynaphthalene	160.06	125			
3511	$C_{10}H_8O_2$	1, 4-Dihydroxynaphthalene	160.06	176			
3512	$C_{10}H_8O_2$	1, 5-Dihydroxynaphthalene	160.06	258			
3513	$C_{10}H_8O_2$	1, 6-Dihydroxynaphthalene	160.06	138			
3514	$C_{10}H_8O_2$	1, 7-Dihydroxynaphthalene	160.06	178			
3515	$C_{10}H_8O_2$	1, 8-Dihydroxynaphthalene	160.06	140			
3516	$C_{10}H_8O_2$	2, 3-Dihydroxynaphthalene	160.06	159			
3517	$C_{10}H_8O_2$	2, 6-Dihydroxynaphthalene	160.06	216			
3518	$C_{10}H_8O_2$	2, 7-Dihydroxynaphthalene	160.06	190			
3519	$C_{10}H_8O_2S$	Naphthalene-1-sulfinic acid	192.13	85			
3520	$C_{10}H_8O_2S$	Naphthalene-2-sulfinic acid	192.13	105			
3521	$C_{10}H_8O_3$	1, 4, 5-Trihydroxynaphthalene	176.06	170			
3522	$C_{10}H_8O_3$	1, 3, 6-Trihydroxynaphthalene	176.06	97			
3523	$C_{10}H_8O_3$	2-Benzoylacrylic acid	176.06	99			
3524	$C_{10}H_8O_3S$	Naphthalene-1-sulfonic acid	208.13	90			
3525	$C_{10}H_8O_3S$	Naphthalene-2-sulfonic acid	208.13	102			
3526	$C_{10}H_8O_4$	Anemonin	192.06	189 s. d.	300 d.		
3527	$C_{10}H_8O_4$	*o*-Carboxycinnamic acid	192.06	175			
3528	$C_{10}H_8O_4$	Furoin	192.06	135			
3529	$C_{10}H_8O_4$	β-Methylesculetin	192.06	204			
3530	$C_{10}H_8O_4$	Scopoletin	192.06	204			
3531	$C_{10}H_8O_4$	1, 4, 5, 6-Tetrahydroxynaphthalene	192.06	154			
3532	$C_{10}H_8O_4S$	α-Naphthol-2-sulfonic acid	224.13	<250			
3533	$C_{10}H_8O_4S$	α-Naphthol-4-sulfonic acid	224.13	170 d.			
3534	$C_{10}H_8O_4S$	α-Naphthol-5-sulfonic acid	224.13	120			
3535	$C_{10}H_8O_4S$	α-Naphthol-8-sulfonic acid	224.13	107			
3536	$C_{10}H_8O_4S$	β-Naphthol-6-sulfonic acid	224.13	125			
3537	$C_{10}H_8O_4S$	β-Naphthol-7-sulfonic acid	224.13	89			
3538	$C_{10}H_8O_5$	Fraxetin	208.06	227			
3539	$C_{10}H_8O_6S_2$	Naphthalene-1, 5-disulfonic acid	288.19	d.			1303
3540	$C_{10}H_8O_6S_2$	Naphthalene-1, 6-disulfonic acid	288.19	125 d.			1271
3541	$C_{10}H_8O_7$	Cotarnic acid	240.06	178			
3542	$C_{10}H_8S$	α-Thionaphthol $C_{10}H_7SH$	160.13		285 d.	1.146^{23}	
3543	$C_{10}H_8S$	β-Thionaphthol $C_{10}H_7SH$	160.13	81	288 s. d.	1.550	
3544	$C_{10}H_9Cl_3O_2$	Chloralacetophenone	267.44	77			
3545	$C_{10}H_9N$	3-Methylquinoline	143.08	14	250	1.074	
3546	$C_{10}H_9N$	4-Methylquinoline (Lepidine)	143.08		262	1.086	
3547	$C_{10}H_9N$	6-Methylquinoline	143.08		255	1.066	1003
3548	$C_{10}H_9N$	7-Methylquinoline	143.08		252.5	1.072	788
3549	$C_{10}H_9N$	8-Methylquinoline	143.08		143^{34}	1.073	789
3550	$C_{10}H_9N$	α-Naphthylamine $C_{10}H_7NH_2$	143.08	50	301	1.131	1080

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3551	$C_{10}H_9N$	β-Naphthylamine $C_{10}H_7NH_2$	143 08	110 2	306.1	1.061_4^{20}	
3552	$C_{10}H_9NO$	3-Amino-β-naphthol	159 08	234			
3553	$C_{10}H_9NO$	7-Amino-β-naphthol .	159 08	163			
3554	$C_{10}H_9NO$	2-Hydroxyquinaldine	159 08	205			
3555	$C_{10}H_9NO$	4-Hydroxyquinaldine	159 08	231			
3556	$C_{10}H_9NO$	6-Hydroxyquinaldine	159 08	213			
3557	$C_{10}H_9NO$	7-Hydroxyquinaldine	159 08	234			
3558	$C_{10}H_9NO$	8-Hydroxyquinaldine	159 08	74	267		
3559	$C_{10}H_9NO$	Echinopsine	159 08	152			
3560	$C_{10}H_9NO_2$	α-Scatolecarboxylic acid	175 08	165			
3572	$C_{10}H_9N_3O_4$	Anilalloxan	235 09	248 d.			
3573	$C_{10}H_{10}$	1, 2-Dihydronaphthalene	130 08	−9	84.5^{16}	0.997	
3574	$C_{10}H_{10}$	1, 4-Dihydronaphthalene	130 08	15 5	212	0.998	844
3575	$C_{10}H_{10}$	1-Ethyl-2-phenylacetylene	130 08		203	0 923	
3576	$C_{10}H_{10}$	Phenylcrotonylene $C_6H_5CH.CHC_2H_5$.	130 08		190		
3578	$C_{10}H_{10}Cl_3NO_3$	Chloral-p-acetaminophenol	298 46	160 d.			
3579	$C_{10}H_{10}NO_4$	Oxycannabin	208 09	182			
3580	$C_{10}H_{10}N_2$	Naphthylene-1, 2-diamine	158 09	96			
3581	$C_{10}H_{10}N_2$	Naphthylene-1, 4-diamine	158 09	120			
3582	$C_{10}H_{10}N_2$	Naphthylene-1, 5-diamine	158 09	189 5			
3583	$C_{10}H_{10}N_2$	1, 6-Naphthylenediamine	158 09	77 5		$1.147_4^{99.4}$	1137
3584	$C_{10}H_{10}N_2$	1, 8-Naphthylenediamine	158 09	66 5		$1.127_4^{99.4}$	1135
3585	$C_{10}H_{10}N_2O$	*N*-Phenyl-3-methylpyrazolone	174 09	127	191^{17}		1287
3586	$C_{10}H_{10}N_2O_4S$	*N*-Sulfophenyl-3-methylpyrazolone	254 16	320 d.			
3587	$C_{10}H_{10}O$	Benzylideneacetone	146 08	42	262	1 008	1068
3588	$C_{10}H_{10}O$	1, 2-Dihydro-β-naphthol	146 08	35	164^{28}		
3589	$C_{10}H_{10}O_2$	*cis*-Isosafrol	162 08	> −18	243	1.117_4^{15}	868
3590	$C_{10}H_{10}O_2$	*trans*-Isosafrol	162 08		248	$1\ 123_4^{15}$	869
3591	$C_{10}H_{10}O_2$	Safrol $CH_2O_2C_6H_3C_3H_5$	162 08	11	234 5	1 096	812
3592	$C_{10}H_{10}O_2$	Benzoylpropionaldehyde	162 08		244 4	$0\ 998^{15}$	
3593	$C_{10}H_{10}O_2$	Benzoylacetone $C_6H_5COCH_2COCH_3$.	162 08	61	262	$1\ 090^{60}$	1106
3594	$C_{10}H_{10}O_2$	1-Benzylacrylic acid $CH_2{:}C(C_7H_7)CO_2H$	162 08	69			
3595	$C_{10}H_{10}O_2$	1-Benzylidenepropionic acid	162 08	74	288		
3596	$C_{10}H_{10}O_2$	2-Benzylidenepropionic acid	162 08	86	302		
3597	$C_{10}H_{10}O_2$	3-Phenylcrotonic acid	162 08	65			
3598	$C_{10}H_{10}O_2$	Allyl benzoate $C_6H_5CO_2C_3H_5$	162 08		230	$1\ 058_{15}^{15}$	
3599	$C_{10}H_{10}O_2$	Benzyl acrylate $C_2H_3CO_2CH_2C_6H_5$	162 08		110^8	$1\ 069_4^8$	
3600	$C_{10}H_{10}O_2$	Methyl cinnamate	162 08	36	259 6	$1\ 042_0^{36}$	973
3601	$C_{10}H_{10}O_2$	Phenylvinyl acetate	162 08		121^{10}	1 065	999
3602	$C_{10}H_{10}O_3$	*o*-Coniferylaldehyde	178 08	131			
3603	$C_{10}H_{10}O_3$	*p*-Coniferylaldehyde	178 08	82 5			
3604	$C_{10}H_{10}O_3$	*m*-Methoxycinnamic acid	178 08	115			
3605	$C_{10}H_{10}O_3$	*p*-Methoxycinnamic acid	178 08	169			
3606	$C_{10}H_{10}O_3$	Methyl benzoylacetate	178 08		265 d.	1 158	712
3607	$C_{10}H_{10}O_4$	1-Benzoyllactic acid	194 08	112			
3608	$C_{10}H_{10}O_4$	Benzylmalonic acid	194 08	117			
3609	$C_{10}H_{10}O_4$	Ferulic acid	194.08	169			
3610	$C_{10}H_{10}O_4$	Hesperetinic acid	194 08	228			
3611	$C_{10}H_{10}O_4$	*o*-Phenylenediacetic acid	194.08	150			
3612	$C_{10}H_{10}O_4$	*m*-Phenylenediacetic acid	194 08	170			
3613	$C_{10}H_{10}O_4$	*p*-Phenylenediacetic acid	194 08	241			
3614	$C_{10}H_{10}O_4$	Dimethyl isophthalate	194 08	68			
3615	$C_{10}H_{10}O_4$	Dimethyl *o*-phthalate	194 08		282	$1\ 189_{25}^{25}$	
3616	$C_{10}H_{10}O_4$	Dimethyl terephthalate	194 08	140	>300		
3617	$C_{10}H_{10}O_4$	Ethyl hydrogen *o*-phthalate	194 08	48			
3618	$C_{10}H_{10}O_4$	Hydroquinone diacetate	194 08	124			
3619	$C_{10}H_{10}O_4$	Methyl acetylsalicylate	194 08	54			
3620	$C_{10}H_{10}O_4$	Resorcinol diacetate	194.08		278 s. d.		
3621	$C_{10}H_{10}O_4$	Meconin	194 08	101	155		
3622	$C_{10}H_{10}O_4$	Salacetol $o\text{-}HOC_6H_4CO_2CH_2COCH_3$	194 08	71			
3623	$C_{10}H_{10}O_5$	Larixinic acid	210 08	153			
3624	$C_{10}H_{10}O_5$	Opianic acid	210 08	150			1333
3625	$C_{10}H_{10}O_6$	Apiolic acid	226.08	175			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
3626	$C_{10}H_{10}O_6$	Hemipinic acid	226.08	186			
3627	$C_{10}H_{11}NO_2$	Acetoacetanilide	177.09	85			
3628	$C_{10}H_{11}NO_2$	Diacetanilide $(CH_3CO)_2N.C_6H_5$	177.09	37	142^{11}		
3629	$C_{10}H_{11}NO_3$	*p*-Diacetylaminophenol	193.09	118			
3630	$C_{10}H_{11}NO_3$	Ethyl oxanilate	193.09	67	300		
3631	$C_{10}H_{11}NO_3$	Methyl hippurate	193.09	80.5			
3632	$C_{10}H_{11}NO_3$	*dl*-Benzoylalanine	193.09	166			
3635	$C_{10}H_{11}NO_4$	Benzacetin	209.09	205			
3636	$C_{10}H_{11}N_3O_4$	4-Nitro-1, 3-diacetylphenylenediamine	237.11	246			
3637	$C_{10}H_{12}$	1, 2, 3, 4-Tetrahydronaphthalene	132.09		207.2	0.971	931
3638	$C_{10}H_{12}$	5, 6, 7, 8-Tetrahydronaphthalene	132.09	-30	207	0.975	930
3639	$C_{10}H_{12}$	β-Phenyl-β-butylene	132.09		189	0.901^{21}	966
3640	$C_{10}H_{12}Br_2O$	2, 4-Dibromothymol	307.92	4	175^{15}	$1.659^{17.4}_{17.4}$	
3641	$C_{10}H_{12}Br_2O_2$	Isoeugenol-1, 2-dibromide	323.92	102			
3642	$C_{10}H_{12}N_2$	Isonicoteine	160.11		293	1.098	760
3643	$C_{10}H_{12}N_2$	Nicoteine	160.11		267	1.078^{12}	
3643.1	$C_{10}H_{12}N_2O$	1-Allyl-2-phenylurea	176.11	115.5			
3644	$C_{10}H_{12}N_2O_2$	Diacetyl-*o*-phenylenediamine	192.11	186			
3645	$C_{10}H_{12}N_2O_2$	Diacetyl-*m*-phenylenediamine	192.11	191			
3646	$C_{10}H_{12}N_2O_2$	Diacetyl-*p*-phenylenediamine	192.11	160			
3647	$C_{10}H_{12}N_2O_3$	5, 5-Diallylbarbituric acid	208.11	171			
3648	$C_{10}H_{12}O$	*p*-Anethol *p*-$CH_3OC_6H_4CH:CHCH_3$	148.09	22.5	235.3	0.986	1044
3649	$C_{10}H_{12}O$	1, 2, 3, 4-Tetrahydro-α-naphthol	148.09		140^{17}	1.090	917
3650	$C_{10}H_{12}O$	5, 6, 7, 8-Tetrahydro-α-naphthol	148.09	68	265.3		
3651	$C_{10}H_{12}O$	1, 2, 3, 4-Tetrahydro-β-naphthol	148.09		265.5	1.071	
3652	$C_{10}H_{12}O$	5, 6, 7, 8-Tetrahydro-β-naphthol	148.09	57.5	276		
3653	$C_{10}H_{12}O$	Benzyl allyl ether $C_6H_5CH_2OC_3H_5$	148.09		204		
3654	$C_{10}H_{12}O$	Ethyl styryl ether $C_6H_5CH:CHOC_2H_5$.	148.09		226	0.982	893
3655	$C_{10}H_{12}O$	Methyl chavicyl ether	148.09		216	0.965	676
3656	$C_{10}H_{12}O$	Cumic aldehyde $(CH_3)_2CHC_6H_4CHO$	148.09		235	0.978	698
3657	$C_{10}H_{12}O$	Mesitylinic aldehyde	148.09		237		
3658	$C_{10}H_{12}O$	3, 4, 5-Trimethylbenzaldehyde	148.09	52			
3659	$C_{10}H_{12}O$	Benzyl acetone $C_6H_5(CH_2)_2COCH_3$.	148.09		236	0.989^{24}_{18}	
3660	$C_{10}H_{12}O$	Ethyl benzyl ketone	148.09		230.2	1.002^{0}_{4}	
3661	$C_{10}H_{12}O$	Phenyl isopropyl ketone	148.09		217	0.984	879
3662	$C_{10}H_{12}O$	Phenyl *n*-propyl ketone	148.09	11	232.3	0.988	
3663	$C_{10}H_{12}O$	*p*-Tolylacetone	148.09	51	233		
3664	$C_{10}H_{12}O$	*p*-Tolyl ethyl ketone	148.09		239^{763}	0.993	690
3665	$C_{10}H_{12}O_2$	3, 5, 6-Trimethyl-2-hydroxybenzaldehyde	164.09	106			
3666	$C_{10}H_{12}O_2$	Eugenol	164.09		253	1.071^{15}	841
3667	$C_{10}H_{12}O_2$	Isoeugenol	164.09	-10	267.5	1.080	936
3668	$C_{10}H_{12}O_2$	Cumic acid $(CH_3)_2CHC_6H_4CO_2H$	164.09	116.5		1.163^4	
3669	$C_{10}H_{12}O_2$	*o*-Isopropylbenzoic acid	164.09	51			
3670	$C_{10}H_{12}O_2$	3-Phenylbutyric acid $C_6H_5(CH_2)_3CO_2H$	164.09	47.5	290		
3671	$C_{10}H_{12}O_2$	*o*-Propylbenzoic acid *o*-$C_3H_7C_6H_4CO_2H$.	164.09	58	273		
3672	$C_{10}H_{12}O_2$	*p*-Propylbenzoic acid	164.09	141			
3673	$C_{10}H_{12}O_2$	3, 4, 5-Trimethylbenzoic acid	164.06	215			
3674	$C_{10}H_{12}O_2$	2, 4, 5-Trimethylbenzoic acid	164.09	149.5			
3675	$C_{10}H_{12}O_2$	2, 4, 6-Trimethylbenzoic acid	164.09	152			
3676	$C_{10}H_{12}O_2$	Benzyl propionate	164.09		220	$1.036^{17.5}$	
3677	$C_{10}H_{12}O_2$	Ethyl phenylacetate $C_6H_5CH_2CO_2C_2H_5$	164.09		226	1.031	589
3678	$C_{10}H_{12}O_2$	Ethyl *o*-toluate $CH_3C_6H_4CO_2C_2H_5$	164.09		221.3	1.033	629
3679	$C_{10}H_{12}O_2$	Ethyl *m*-toluate $CH_3C_6H_4CO_2C_2H_5$.	164.09		226.4	1.028	624
3680	$C_{10}H_{12}O_2$	Ethyl *p*-toluate $CH_3C_6H_4CO_2C_2H_5$	164.09		228	1.026	636
3681	$C_{10}H_{12}O_2$	Isopropyl benzoate	164.09		218.5	1.017^{15}_{15}	
3681.1	$C_{10}H_{12}O_2$	*d*-Methylbenzylcarbinyl formate	164.09		110^{19}	1.027^{22}	595
3682	$C_{10}H_{12}O_2$	Methyl hydrocinnamate	164.09		239	1.018^{49}	
3683	$C_{10}H_{12}O_2$	Phenyl *n*-butyrate $C_3H_7CO_2C_6H_5$	164.09		228	1.027^{15}_{15}	
3684	$C_{10}H_{12}O_2$	*n*-Propyl benzoate $C_6H_5CO_2C_3H_7$	164.09	-51.6	231.2	1.027	
3685	$C_{10}H_{12}O_2$	Thymoquinone	164.09	45.5	232		
3686	$C_{10}H_{12}O_3$	Coniferyl alcohol	180.09	74			
3687	$C_{10}H_{12}O_3$	Benzyl lactate.	180.09		130^6		1025
3688	$C_{10}H_{12}O_3$	Ethyl anisate *p*-$CH_3OC_6H_4CO_2C_2H_5$.	180.09	7.8	263	1.106	680

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3689	$C_{10}H_{12}O_3$	Ethyl mandelate	180.09	34	255		
3690	$C_{10}H_{12}O_3$	Propyl salicylate o-$HOC_6H_4CO_2C_3H_7$	180.09		240	1.099^{18}	
3691	$C_{10}H_{12}O_4$	Cantharic acid	196.09	278			
3692	$C_{10}H_{12}O_4$	Ethyl vanillate	196.09	44	293		
3693	$C_{10}H_{12}O_4$	Cantharidin	196.09	212			
3694	$C_{10}H_{12}O_4$	Guaiacyl methyl glycollate	196.09		156^{15}	1.180	
3695	$C_{10}H_{12}O_4$	Sparassol	196.09	68			
3696	$C_{10}H_{12}O_5$	Asaronic acid	212.09	144	300		
3697	$C_{10}H_{12}O_5$	Glycerol monosalicylate	212.09	76		1.366	
3698	$C_{10}H_{12}O_6$	β-Anemoninic acid	228.09	189			
3699	$C_{10}H_{13}ClO$	4-Chlorothymol	184.56	64			
3700	$C_{10}H_{13}ClO$	6-Chlorothymol	184.56	64			
3701	$C_{10}H_{13}N$	Kairoline (1-Methyl-1, 2, 3, 4-tetrahydroquinoline)	147.11		245.5	1.021	1005
3702	$C_{10}H_{13}N$	5, 6, 7, 8-Tetrahydro-α-naphthylamine	147.11		276.8	$1.054_4^{23.1}$	1006
3703	$C_{10}H_{13}N$	5, 6, 7, 8-Tetrahydro-β-naphthylamine	147.11	38	278.5	$1.029_4^{22.2}$	986
3704	$C_{10}H_{13}NO$	o-Acetylmethyltoluidine	163.11	56			
3705	$C_{10}H_{13}NO$	p-Acetylmethyltoluidine	163.11	80			
3706	$C_{10}H_{13}NO$	N-Butyranilide $C_6H_5NHOCC_3H_7$	163.11	92	189^{15}		
3707	$C_{10}H_{13}NO$	3, 5-Dimethylacetanilide	163.11	174			
3708	$C_{10}H_{13}NO$	ω-Dimethylaminoacetophenone	163.11	59			
3709	$C_{10}H_{13}NO$	N-Ethylacetanilide	163.11	54.5	259	0.994_4^{60}	
3710	$C_{10}H_{13}NO$	Thalline	163.11	43	283.8		
3711	$C_{10}H_{13}NO_2$	1-Anilinobutyric acid	179.11	141			
3712	$C_{10}H_{13}NO_2$	Propyl p-aminobenzoate	179.11	76			
3713	$C_{10}H_{13}NO_2$	o-Acetphenetidine	179.11	79	<250		
3714	$C_{10}H_{13}NO_2$	m-Acetphenetidine.	179.11	96			
3715	$C_{10}H_{13}NO_2$	2-Nitrocymene	179.11		152^{15}	1.085^{15}	
3716	$C_{10}H_{13}NO_2$	Phenacetin $C_2H_5OC_6H_4NHCOCH_3$	179.11	135	d.		1246
3717	$C_{10}H_{13}NO_3$	Damascenine	195.11	27	168		
3718	$C_{10}H_{13}NO_3$	2-Nitrothymol	195.11	119			
3719	$C_{10}H_{13}NO_3$	4-Nitrothymol	195.11	142			
3720	$C_{10}H_{13}NO_3$	Ratanhine	195.11	252			
3721	$C_{10}H_{13}NO_3$	Surinamine (N-Methyltyrosine)	195.11	280 d.			
3722	$C_{10}H_{13}N_3O_4$	2, 4-Dinitro-N-diethylaniline	239.12	80			
3723	$C_{10}H_{13}N_5O_5$	Vernine	283.14	240			
3724	$C_{10}H_{14}$	n-Butylbenzene $CH_3(CH_2)_3C_6H_5$	134.11		180	0.862	554
3725	$C_{10}H_{14}$	$sec.$-Butylbenzene $C_2H_5(CH_3)CHC_6H_5$	134.11		175	0.860	550
3726	$C_{10}H_{14}$	$tert.$-Butylbenzene $(CH_3)_3C.C_6H_5$	134.11		168.7	0.867	582
3727	$C_{10}H_{14}$	o-Cymene o-$CH_3(CH_2)_2C_6H_4CH_3$	134.11		157	0.858^{18}	601
3728	$C_{10}H_{14}$	m-Cymene m-$CH_3(CH_2)_2C_6H_4CH_3$	134.11	> −25	175	0.860	559
3728 1	$C_{10}H_{14}$	p-Cymene p-$CH_3(CH_2)_2C_6H_4CH_3$	134.11	−73.5	176	0.857	1022
3729	$C_{10}H_{14}$	o-Diethylbenzene o-$(C_2H_5)_2C_6H_4$	134.11	< −20	184.5	0.866	
3730	$C_{10}H_{14}$	m-Diethylbenzene m-$(C_2H_5)_2C_6H_4$.	134.11	< −20	182	0.860	
3731	$C_{10}H_{14}$	p-Diethylbenzene p-$(C_2H_5)_2C_6H_4$	134.11	−35	183	0.865	569.1
3732	$C_{10}H_{14}$	1, 2, 4, 5-Tetramethylbenzene	134.11	80	195	$0.838_4^{81.3}$	1273
3733	$C_{10}H_{14}$	4-Ethyl-m-xylene $C_2H_5C_6H_3(CH_3)_2$.	134.11	< −20	183	0.878	
3734	$C_{10}H_{14}$	5-Ethyl-m-xylene $C_2H_5C_6H_3(CH_3)_2$	134.11	< −20	185	0.861	
3735	$C_{10}H_{14}$	Hexahydronaphthalene	134.11		205.5	0.934	
3736	$C_{10}H_{14}$	Isobutylbenzene $(CH_3)_2CHCH_2C_6H_5$	134.11		171.4	0.858^{15}	562
3739	$C_{10}H_{14}$	1, 2, 3, 5-Tetramethylbenzene	134.11		197	0.896_4^0	
3740	$C_{10}H_{14}$	1, 2, 3, 4-Tetramethylbenzene	134.11	−4	204	0.901	662
3741	$C_{10}H_{14}$	Verbenene	134.11		159	0.886^{15}	593
3742	$C_{10}H_{14}Br_2O$	d-α, α'-Dibromocamphor	309.94	61			1209
3743	$C_{10}H_{14}ClN$	Thermin (Tetrahydro-β-naphthylamine hydrochloride).	183.57	237			
3744	$C_{10}H_{14}Cl_2O$	α-Dichlorocamphor	221.02	96	200 d.	4 2	
3745	$C_{10}H_{14}Cl_2O$	β-Dichlorocamphor	221.02	77			
3746	$C_{10}H_{14}N_2$	Isonicotine	162.12	78	260 d.		
3747	$C_{10}H_{14}N_2$	Nicotine	162.12		274.3	1.009	695
3748	$C_{10}H_{14}N_2$	Nicotimine	162.12		250		
3749	$C_{10}H_{14}N_2O_2$	6-Nitroso-3-(diethylamino) phenol	194.12	84			
3750	$C_{10}H_{14}N_2O$	p-Nitroso-N-diethylaniline	178.12	84			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3751	$C_{10}H_{14}N_2O_2$	Phenocoll p-$C_2H_5OC_6H_4NHCOCH_2NH_2$	194.12	100.5			
3752	$C_{10}H_{14}O$	Carvacrol	150.11	0.5	237.0	0.976	**678**
3753	$C_{10}H_{14}O$	*d*-Carvol	150.11		225	0.960	**940**
3754	$C_{10}H_{14}O$	Cuminal alcohol	150.11		246.6	0.978^{15}	
3754.1	$C_{10}H_{14}O$	Methyl *d*-methylbenzyl carbinol	150.11		85^{12}	0.927^{27}	
3754.2	$C_{10}H_{14}O$	Methyl *l*-phenylethyl carbinol	150.11		132^{14}	0.9767	**658**
3755	$C_{10}H_{14}O$	3-Methyl-2-hydroxyisopropylbenzene	150.11		226	$0.987^{15.2}$	**669**
3756	$C_{10}H_{14}O$	Thymol $(CH_3)_2CHC_6H_3(OH)CH_3$	150.11	51.5	231.8	0.969	**1170**
3757	$C_{10}H_{14}O$	5-Methyl-2-hydroxyisopropylbenzene	150.11	36	229	$0.982^{17.5}$	**674**
3758	$C_{10}H_{14}O$	Benzyl propyl ether $C_6H_5CH_2OC_3H_7$	150.11		196		
3759	$C_{10}H_{14}O$	*n*-Butyl phenyl ether $C_6H_5OC_4H_9$	150.11		210.3	0.950^{0}	
3760	$C_{10}H_{14}O$	Isobutyl phenyl ether.	150.11		198	0.939^{14}	
3761	$C_{10}H_{14}O$	Myrtenal (Myrtenic aldehyde)	150.11		90^{10}	0.988	**616**
3762	$C_{10}H_{14}O$	Eucarvol	150.11		106^{20}	0.952	**845**
3763	$C_{10}H_{14}O$	Pinocarvol	150.11		224	0.984	**620**
3764	$C_{10}H_{14}O$	*d*(*l*)-Piperitone	150.11		235	0.934^{vac}	**542**
3765	$C_{10}H_{14}O$	Umbellulone	150.11		220	0.958	**551**
3766	$C_{10}H_{14}O_2$	*o*-Diethoxybenzene o-$(C_2H_5O)_2C_6H_4$	166.11	45			
3767	$C_{10}H_{14}O_2$	Coerulignol	166.11		246	1.049^{15}	
3768	$C_{10}H_{14}O_2$	Hydroquinone diethyl ether	166.11	72			
3769	$C_{10}H_{14}O_2$	Resorcinol diethyl ether	166.11	12.4	235.2		
3770	$C_{10}H_{14}O_2$	*d*-Camphorquinone..	166.11	198			
3771	$C_{10}H_{14}O_2$	Thymohydroquinone	166.11	143	290		
3772	$C_{10}H_{14}O_2$	Crocetin	166.11	104			
3773	$C_{10}H_{14}O_3$	*dl*-Camphoric anhydride	182.11	221	270		
3774	$C_{10}H_{14}O_4$	1, 2, 3, 5-Tetramethoxybenzene	198.11	47	271		
3775	$C_{10}H_{14}O_4$	Guaiamar..	198.11	75			
3776	$C_{10}H_{14}O_4$	Diethyl muconate	198.11	13; 62	64	$0.983_{4}^{20.1}$	
3777	$C_{10}H_{14}O_5$	Pinoylformic acid	214.11	80			
3777.1	$C_{10}H_{14}O_6$	Diallyl tartrate	230.11		191^{20}	$1.187^{24.6}$	
3778	$C_{10}H_{15}BrO$	α-Bromocamphor	231.03	78	274	1.449	**1252**
3779	$C_{10}H_{15}BrO$	β-Bromocamphor	231.03	61	130^{10}		
3780	$C_{10}H_{15}Cl$	Myrtenyl chloride	170.57		90^{12}	1.015	**586**
3782	$C_{10}H_{15}ClO$	α-Chlorocamphor	186.57	125	220 s d		
3783	$C_{10}H_{15}ClO$	β-Chlorocamphor	186.57	92.5	247		
3784	$C_{10}H_{15}ClO$	γ-Chlorocamphor	186.57	100	237 s d.		
3785	$C_{10}H_{15}N$	*n*-Butylaniline $C_6H_5NHC_4H_9$	149.12		240.9		
3786	$C_{10}H_{15}N$	2-Dimethylamino-*m*-xylene	149.12		196.2	0.915	**649**
3787	$C_{10}H_{15}N$	4-Dimethylamino-*m*-xylene	149.12		232.2	0.939	**730**
3788	$C_{10}H_{15}N$	4-Dimethylamino-*o*-xylene	149.12		205	0.916	**663**
3789	$C_{10}H_{15}N$	Diethylaniline $C_6H_5N(C_2H_5)_2$	149.12	−34.4	216.27	0.934	**717**
3790	$C_{10}H_{15}N$	Isobutylaniline $C_6H_5NHCH_2CH(CH_3)_2$	149.12		242	0.940	
3791	$C_{10}H_{15}N$	Prehnidine 1, 2, 3, 4-$C_6H_2(CH_3)_4$	149.12	70	260		
3792	$C_{10}H_{15}NO$	*m*-Diethylaminophenol	165.12	78	278		
3793	$C_{10}H_{15}NO$	Ephedrine.	165.12	40	255		
3794	$C_{10}H_{15}NO$	Hordenine	165.12	118	174^{11}		
3795	$C_{10}H_{15}NO$	Pseudoephedrine	165.12	117			
3796	$C_{10}H_{15}NO_3S$	Diethylaniline-*m*-sulfonic acid	229.19	270 d.			
3797	$C_{10}H_{15}N_3O_5$	Pilocarpidine nitrate	257.14	137			**1333**
3800	$C_{10}H_{16}$	*l*-Bornylene	136.12	111	147		
3801	$C_{10}H_{16}$	*dl*-Camphene	136.12	50	160	0.822	**1116**
3802	$C_{10}H_{16}$	*d*(*l*)-Camphene	136.12	42.7	159		**1074**
3803	$C_{10}H_{16}$	Camphilene	136.12		156	0.87^{15}	
3804	$C_{10}H_{16}$	*d*(*l*)-Δ^4-Carene	136.12		167^{707}	0.855_{20}^{20}	**1037**
3805	$C_{10}H_{16}$	Cyclofenchene	136.12		144	0.861	**445**
3806	$C_{10}H_{16}$	Dipentene..	136.12		176	0.865^{15}	**515**
3807	$C_{10}H_{16}$	*d*(*l*)-Fenchene	136.12		150	0.869	**955**
3808	$C_{10}H_{16}$	Fenchylene.	136.12		142	0.840	**435**
3809	$C_{10}H_{16}$	Geraniene	136.12		164	0.843	
3810	$C_{10}H_{16}$	*d*(*l*)-Limonene	136.12	−96.9	177	0.842	**510**
3811	$C_{10}H_{16}$	Myrcene	136.12		167	0.802	**503**
3812	$C_{10}H_{16}$	Ocimene	136.12		74^{21}	0.799	**835**
3813	$C_{10}H_{16}$	*cis*-β-Octalin	136.12		73^{15}	0.915	**984**

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
3814	$C_{10}H_{16}$	*trans*-β-Octalin	136 12		190	0.909^{13}	
3815	$C_{10}H_{16}$	*d(l)*-α-Phellandrene	136.12		175	0.843	983
3816	$C_{10}H_{16}$	β-Phellandrene	136 12		171	0.852	527
3817	$C_{10}H_{16}$	*dl*-α-Pinene	136 12	−55	154	0.878	
3818	$C_{10}H_{16}$	*l*-β-Pinene	136 12		164	0.873^{15}	824
3819	$C_{10}H_{16}$	Sabinene.	136 12		165	0.842	914
3820	$C_{10}H_{16}$	*d(l)*-Sylvestrene	136 12		177	0.863	919
3821	$C_{10}H_{16}$	α-Terpinene	136 12		175	0.834	915
3822	$C_{10}H_{16}$	β-Terpinene	136 12		174	0.840	982
3823	$C_{10}H_{16}$	$\Delta^{1\ 5}$-Terpinene	136.12		182	0.855	541
3824	$C_{10}H_{16}$	Terpinolene.	136 12		185	0 855	537
3825	$C_{10}H_{16}$	Terpinylene	136 12		175		
3826	$C_{10}H_{16}$	α-Thujene	136 12		151	0.830	440
3827	$C_{10}H_{16}$	β-Thujene	136.12		147.7	0.821	420
3828	$C_{10}H_{16}ClNO$	Ephedrine hydrochloride	201.59	210			
3829	$C_{10}H_{16}ClNO$	α-Limonene nitrosylchloride	201 60	104			
3830	$C_{10}H_{16}ClNO$	Pseudoephedrine hydrochloride	201.59	175			
3831	$C_{10}H_{16}Cl_2$	α-Camphordichloride	207 04	148			
3832	$C_{10}H_{16}Cl_2$	β-Camphordichloride	207 04	178			
3833	$C_{10}H_{16}N_2$	*p*-Aminodiethylaniline	164.14		262		
3834	$C_{10}H_{16}N_2$	*o*-Tetramethylphenylenediamine	164 14		218		
3835	$C_{10}H_{16}N_2$	*m*-Tetramethylphenylenediamine	164 14	−2	262	$0\ 988^{15\ 8}$	
3836	$C_{10}H_{16}N_2$	*p*-Tetramethylphenylenediamine	164 14	51	260		
3837	$C_{10}H_{16}N_2O_2$	α-Camphordioxime	196 14	182 d.			
3838	$C_{10}H_{16}N_2O_2$	γ-Camphordioxime	196 14	132			
3839	$C_{10}H_{16}N_2O_3$	5, 5-*n*-Butylethylbarbituric acid	212.14	128			
3840	$C_{10}H_{16}N_2O_3$	5, 5-*sec*.-Butylethylbarbituric acid	212 14	157			
3841	$C_{10}H_{16}N_2O_3$	5, 5-Dipropylbarbituric acid	212.14	145			
3842	$C_{10}H_{16}N_2O_3$	5, 5-Isobutylethylbarbituric acid	212 14	176			
3843	$C_{10}H_{16}N_2O_3$	5, 5-*n*-Propylisopropylbarbituric acid	212.14	162			
3844	$C_{10}H_{16}O$	Alantol	152.12		200		
3845	$C_{10}H_{16}O$	*dl*-Camphor	152 12	174			
3846	$C_{10}H_{16}O$	*d*-Camphor	152 12	179	209 1	$0\ 990^{25}$	
3847	$C_{10}H_{16}O$	Carvenone	152 12		233	0 926	897
3848	$C_{10}H_{16}O$	Caryophyllin	152 12	295			
3849	$C_{10}H_{16}O$	α-Citral	152.12		229	$0\ 893^{15}$	920
3850	$C_{10}H_{16}O$	β-Citral	152.12		104^{12}	0 888	956
3851	$C_{10}H_{16}O$	Cyclocitral	152 12		114^{29}	$0\ 957^{16}_{4}$	825
3852	$C_{10}H_{16}O$	*d*-Fenchone	152 12	6	195	0 944	839
3853	$C_{10}H_{16}O$	Hartin	152.12	230		1 120	
3854	$C_{10}H_{16}O$	Isopulegon	152 12		90^{12}	$0.921^{17\ 5}$	499
3855	$C_{10}H_{16}O$	Myristicol	152 12		218		
3856	$C_{10}H_{16}O$	Myrtenol	152 12		224	0 976	581
3857	$C_{10}H_{16}O$	Phellandral	152 12		230	0 945	553
3858	$C_{10}H_{16}O$	Pinol	152 12		184	0 942	507
3859	$C_{10}H_{16}O$	Pulegon	152.12		224	0 937	861
3860	$C_{10}H_{16}O$	Sabinol.	152.12		209	0 943	546
3861	$C_{10}H_{16}O$	α-Thujone	152.12		200	0 913	827
3862	$[C_{10}H_{16}O]_x$	Urson	$[152\ 12]_x$	264			
3863	$C_{10}H_{16}O_2$	Acetylmethylheptenone	168.12	−6	234	$0\ 945^{15}$	860
3864	$C_{10}H_{16}O_2$	Ascaridol	168.12		84^{5}	$1\ 008^{15}$	518
3865	$C_{10}H_{16}O_2$	Geranic acid	168.12		119^{20}	0 952	544
3866	$C_{10}H_{16}O_2$	Hydroxycamphor	168.12	205			
3867	$C_{10}H_{16}O_3$	*d(l)*-Pinonic acid	184 12	99	180^{12}		
3867 1	$C_{10}H_{16}O_3$	*dl*-Pinonic acid	184.12	105		1.216	
3868	$C_{10}H_{16}O_4$	*dl*-Camphoric acid	200.12	202			
3869	$C_{10}H_{16}O_4$	*d*-Camphoric acid	200.12	187			
3870	$C_{10}H_{16}O_4$	Cyclohexyl acid succinate	200.12	44			
3871	$C_{10}H_{16}O_4$	*dl*-Isocamphoric acid.	200.12	191			
3872	$C_{10}H_{16}O_4$	*d*-Methyl pinate	200.12		130^{9}	1.055	
3873	$C_{10}H_{16}O_5$	*l*-Cineolic acid	216.12	196			1325
3874	$C_{10}H_{16}O_5$	Diethyl acetylsuccinate	216.12		256 d.	1.081	884
3875	$C_{10}H_{17}Br$	*d*-Pinene hydrobromide	217.05	80			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3876	$C_{10}H_{17}Cl$	Camphene hydrochloride	172 59	156 5			
3877	$C_{10}H_{17}Cl$	*cis*-β-Chlorodecalin.	172 59		112^{15}		
3878	$C_{10}H_{17}Cl$	Fenchyl chloride	172 59		85^{14}	0 983	
3879	$C_{10}H_{17}Cl$	Geranyl chloride	172 59		103^{14}	0 918^{25}	**517**
3880	$C_{10}H_{17}Cl$	Isobornyl chloride	172 59	161 5			
3881	$C_{10}H_{17}Cl$	*d*-Pinene hydrochloride	172 59	128	207 1		
3882	$C_{10}H_{17}N$	Camphenamine . .	151 14		205 5	0 940	**564**
3883	$C_{10}H_{17}N$	Pinylamine.	151 14		207	0 940	**613**
3884	$C_{10}H_{17}NO$	Camphoroxime	167 14	119 5	249		
3885	$C_{10}H_{17}NO$	*d*-Fenchoneoxime	167 14	165	240		
3886	$C_{10}H_{17}NO_2$	*l*-Ecgonine methyl ester	199 14			1 147	**547**
3886 1	$C_{10}H_{17}NO_3$	*dl*-α-Pinone oxime.	199 14	150		1 210	
3887	$C_{10}H_{17}NO_6$	Phaseolunatin .	247 14	144			
3888	$C_{10}H_{18}$	Camphane .	138 14	152	160		
3889	$C_{10}H_{18}$	Carane	138 14		50^{9}	0.838^{20}_{20}	**459**
3890	$C_{10}H_{18}$	*cis*-Decahydronaphthalene	138 14	− 125	193 3	0 898	**539**
3891	$C_{10}H_{18}$	*trans*-Decahydronaphthalene	138 14		185 3	0 872	**504**
3892	$C_{10}H_{18}$	*d*-Menthene . .	138 14		168	1 4481	**423**
3893	$C_{10}H_{18}$	*d*-Pinane	138 14	− 45	169 1	0 839	**448**
3894	$C_{10}H_{18}$	Pinocamphane	138 14		164 9	0 856	**477**
3895	$C_{10}H_{18}$	Thujane	138 14		157	0 814	**363**
3896	$C_{10}H_{18}Cl_2N_2$	*o*-Tetramethylphenylenediamine hydrochloride	237 07	180			
3897	$C_{10}H_{18}O$	Apopinol	154 14		199	0 894^{18}	
3899	$C_{10}H_{18}O$	Aurantiol	154 14		95^{15}	0 869^{20}	
3900	$C_{10}H_{18}O$	*dl*-Borneol	154 14	210 5			
3901	$C_{10}H_{18}O$	*d*(*l*)-Borneol	154 14	208 6	213 5	1.011	
3902	$C_{10}H_{18}O$	Cineol	154 14	− 1	176 4	0.901^{18}	**474**
3903	$C_{10}H_{18}O$	*d*-Citronellal	154 14		208	0 856	
3904	$C_{10}H_{18}O$	*dl*-Fenchyl alcohol	154 14	33	204 6	0 953	
3905	$C_{10}H_{18}O$	*dl*, (*d*)-Fenchyl alcohol	154 14	42	201	0 935^{40}	
3906	$C_{10}H_{18}O$	*dl*, (*l*)-Fenchyl alcohol	154 14	47	201	0 933^{50}	
3907	$C_{10}H_{18}O$	*d*, (*l*)-Fenchyl alcohol	154.14	49	209		
3908	$C_{10}H_{18}O$	Geraniol . .	154 14	< −15	229	0 881	**531**
3909	$C_{10}H_{18}O$	*dl*-Isoborneol	154 14	212			
3910	$C_{10}H_{18}O$	*d*(*l*)-Isoborneol	154 14	216			
3911	$C_{10}H_{18}O$	*dl*-Isofenchyl alcohol	154 14		204		
3912	$C_{10}H_{18}O$	*l*-Isofenchyl alcohol.	154 14	62	202	0.961^{15}	**859**
3913	$C_{10}H_{18}O$	Isopulegol	154 14		102^{12}	0 915	**513**
3913 1	$C_{10}H_{18}O$	*l*-Isopulegol	154 14		94^{11}	0.9110	**509**
3914	$C_{10}H_{18}O$	Lavendol	154 14		199	0 873^{15}	
3915	$C_{10}H_{18}O$	*d*-Linalool	154 14		198 3	0 875	**480**
3916	$C_{10}H_{18}O$	*l*-Linalool	154 14		195	0 866^{15}	**981**
3917	$C_{10}H_{18}O$	*dl*-Menthone	154 14		210	0 897	**441**
3918	$C_{10}H_{18}O$	*l*-Menthone	154 14		207	0 896	
3919	$C_{10}H_{18}O$	Myrcenol	154 14		101^{10}	0 $901^{14\ 5}$	**840**
3920	$C_{10}H_{18}O$	Nerol	154 14		225 2	0 881	
3921	$C_{10}H_{18}O$	Pinen hydrate (Homopinol)	154 14	59	205		
3922	$C_{10}H_{18}O$	*dl*, α-Terpineol.	154 14	35	219 8	0 936	**538**
3923	$C_{10}H_{18}O$	*d*(*l*), α-Terpineol	154 14	40	217 7	0 919	**890**
3924	$C_{10}H_{18}O$	β-Terpineol	154 14	33	210 3	0 819^{20}_{20}	**521**
3925	$C_{10}H_{18}O$	γ-Terpineol	154 14	70			
3926	$C_{10}H_{18}O$	*dl*-Terpinen-4-ol. . .	154 14		214	0 929	**533**
3927	$C_{10}H_{18}O$	*d*-Terpinen-4-ol (Origanol)	154 14		212	0 926	**526**
3928	$C_{10}H_{18}O$	Thujyl alcohol . . .	154 14		212	0 921	**923**
3929	$C_{10}H_{18}O_2$	Acetylmethyl hexyl ketone	170 14	−6	237 d.	0 907^{24}_{24}	
3930	$C_{10}H_{18}O_2$	*d*(*l*)-Campholic acid	170 14	107	260		
3931	$C_{10}H_{18}O_2$	*d*-Citronellic acid	170 14		257	0 931	
3932	$C_{10}H_{18}O_2$	9, 10-Decylenic acid	170 14	<0	142^{4}		
3933	$C_{10}H_{18}O_2$	Fencholic acid . .	170 14	18	255	$0.970^{18.9}$	**462**
3934	$C_{10}H_{18}O_3$	Pinol glycol . .	186 14	129			
3935	$C_{10}H_{18}O_3$	*n*-Valeric anhydride $(C_4H_9CO)_2O$. .	186 14		215	0.929	
3936	$C_{10}H_{18}O_3$	Isovaleric anhydride.	186.14		215	0.933	**229**

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3937	$C_{10}H_{18}O_3$	Ethyl diethylacetoacetate	186.14		158.2	1.282	327
3938	$C_{10}H_{18}O_4$	Sebacic acid $HO_2C(CH_2)_8CO_2H$	202.14	127	294.5^{100}		1161
3939	$C_{10}H_{18}O_4$	Isoamyl ethyl malonate	202.14		150^{20}	0.954^{25}_{25}	306
3940	$C_{10}H_{18}O_4$	*n*-Butyl isopropylmalonate	202.14		136^{14}	0.974^{25}_{25}	331
3941	$C_{10}H_{18}O_4$	Di-*n*-butyl oxalate $(CO_2C_4H_9)_2$	202.14		243.4	1.0108	
3942	$C_{10}H_{18}O_4$	Diisobutyl oxalate	202.14		229	1.002^{14}	
3943	$C_{10}H_{18}O_4$	Dipropyl succinate	202.14		250.8	1.006^{15}	
3944	$C_{10}H_{18}O_5$	Dipropyl malate	218.14	10.5	151^{10}	1.075	366
3945	$C_{10}H_{18}O_6$	Dipropyl *d*-tartrate $[HOCHCO_2C_3H_7]_2$.	234.14		303	1.139	
3945.1	$C_{10}H_{18}O_6$	Di-*sec*.-propyl tartrate	234.14		158^{16}	$1.116^{13.7}$	
3946	$C_{10}H_{18}O_9$	Arabin	282.14	260			
3947	$C_{10}H_{19}Cl$	*sec*.-Menthyl chloride	174.60		215	0.941	485
3948	$C_{10}H_{19}Cl$	*tert*.-Menthyl chloride	174.60		$94^{18.5}$	0.948	488
3949	$C_{10}H_{19}N$	Bornylamine	153.15	163	200		
3950	$C_{10}H_{19}N$	Camphylamine	153.15		198		
3951	$C_{10}H_{19}N$	*l*-Fenchylamine	153.15		195	0.910^{22}	
3952	$C_{10}H_{19}N$	Geranylamine	153.15		105^{19}	0.829^{25}	511
3953	$C_{10}H_{19}NO$	Lupinine	169.15	68	257		
3954	$C_{10}H_{19}NO_3$	Sebamic acid	201.15	170			
3955	$C_{10}H_{20}$	α-Decylene $CH_2:CH(CH_2)_7CH_3$	140.15		172	0.763^0	912
3956	$C_{10}H_{20}$	γ-Decylene $C_3H_7CH:CHC_5H_{11}$	140.15		161		
3957	$C_{10}H_{20}$	2, 3-Dimethyl-2-octene	140.15		162^{650}	0.748	
3958	$C_{10}H_{20}$	2, 6-Dimethyl-1(2)-octene	140.15		169	0.789^0	993
3959	$C_{10}H_{20}$	*o*-Menthane	140.15		171	0.814	965
3960	$C_{10}H_{20}$	*m*-Menthane	140.15		168.2	0.790	387
3961	$C_{10}H_{20}$	*p*-Menthane	140.15		170	0.793	358
3962	$C_{10}H_{20}$	2-Methyl-5-ethyl-5-heptene	140.15		158.4	0.761^0	302
3963	$C_{10}H_{20}$	3, 3, 5-Trimethyl-4-heptene	140.15		157.5	0.788^0_0	
3964	$C_{10}H_{20}ClNO$	Lupinine hydrochloride	205.62	213			1244
3965	$C_{10}H_{20}N_2O_6$	Lycetol (Dimethylpiperazine tartrate)	264.17	250			
3966	$C_{10}H_{20}O$	α-Carvacromenthol	156.15		219		
3967	$C_{10}H_{20}O$	β-Carvacromenthol	156.15		222	0.918^0	
3968	$C_{10}H_{20}O$	*d*-Citronellol	156.15		221.7	0.857^{15}	410
3969	$C_{10}H_{20}O$	*l*-Citronellol	156.15		114^{15}	0.861	464
3970	$C_{10}H_{20}O$	*d*-Isomenthol	156.15	83			
3971	$C_{10}H_{20}O$	*o*-Menthan-2-ol	156.15		95^{25}		
3972	$C_{10}H_{20}O$	*p*-Menthan-8-ol	156.15	36	207.4		
3973	$C_{10}H_{20}O$	*l*-α-Menthol	156.15	42.5	212	0.890^{15}_{15}	1168
3974	$C_{10}H_{20}O$	*l*-β-Menthol	156.15	35.5	212	0.890^{15}_{15}	
3974.1	$C_{10}H_{20}O$	*l*-Neomenthol	156.15	< −15	105^{21}	0.8995	473
3975	$C_{10}H_{20}O$	*n*-Capric aldehyde $CH_3(CH_2)_8CHO$.	156.15		209.2	0.828^{15}	307
3976	$C_{10}H_{20}O$	Isocapric aldehyde	156.15		169.6	0.828^0	
3977	$C_{10}H_{20}O$	Isopropyl *n*-hexyl ketone	156.15		210	0.841^{17}	
3978	$C_{10}H_{20}O$	Methyl *n*-octyl ketone $CH_3COC_8H_{17}$	156.15	3.5	211	0.825	
3978.1	$C_{10}H_{20}O$	Propyl hexyl ketone $C_3H_7COC_6H_{13}$	156.15	−9	207	0.824	
3979	$C_{10}H_{20}O_2$	*cis*-Terpine	172.15	104.7	258		
3980	$C_{10}H_{20}O_2$	*trans*-Terpine.	172.15	158	265		
3981	$C_{10}H_{20}O_2$	*n*-Capric acid $CH_3(CH_2)_8CO_2H$	172.15	31	268.4	0.895^{30}	1038
3981.1	$C_{10}H_{20}O_2$	Di-*n*-butylacetic acid	172.15		140^{16}	$0.898^{18.4}$	
3982	$C_{10}H_{20}O_2$	*n*-Amyl valerate $C_4H_9CO_2C_5H_{11}$	172.15		203.7	0.881^0	213
3983	$C_{10}H_{20}O_2$	*n*-Butyl caproate $C_6H_{13}CO_2C_4H_9$	172.15		204.3	0.882^0_0	
3984	$C_{10}H_{20}O_2$	Ethyl *n*-caprylate $C_7H_{15}CO_2C_2H_5$	172.15	−44.8	205.8	0.878^{17}	
3985	$C_{10}H_{20}O_2$	*n*-Heptyl propionate $C_2H_5CO_2C_7H_{15}$.	172.15		208	0.885^0	
3986	$C_{10}H_{20}O_2$	Isoamyl isovalerate	172.15		194	0.870^0	198
3987	$C_{10}H_{20}O_2$	Methyl pelargonate $C_8H_{17}CO_2CH_3$	172.15		214	$0.877^{17.5}$	
3988	$C_{10}H_{20}O_2$	*d*-γ-Nonyl formate	172.15		95^{22}	0.869	258
3989	$C_{10}H_{20}O_2$	*n*-Octyl acetate $CH_3CO_2C_8H_{17}$	172.15	−38.5	210	0.885^0_4	250
3991	$C_{10}H_{20}O_3$	1-Hydroxycapric acid	188.15	70.5			
3992	$C_{10}H_{21}N$	*l*-Menthylamine	155.17		208.2	0.860	475
3993	$C_{10}H_{22}$	*n*-Decane $CH_3(CH_2)_8CH_3$	142.17	−32.0	174	0.747	220
3994	$C_{10}H_{22}$	2, 6-Dimethyloctane	142.17		159	0.734	185
3995	$C_{10}H_{22}$	2, 7-Dimethyloctane	142.17	−52.8	160	0.722	171
3996	$C_{10}H_{22}$	*dl*, 3, 6-Dimethyloctane	142.17		162		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
3997	$C_{10}H_{22}$	d, 3, 6-Dimethyloctane	142.17		160.8	0.735^{13}	
3998	$C_{10}H_{22}$	2-Methylnonane $(CH_3)_2CH(CH_2)_6CH_3$	142.17		160	$0.728_4^{16.1}$	174
3999	$C_{10}H_{22}$	3-Methylnonane $C_2H_5(CH_3)CHC_6H_{13}$..	142.17		166.9	0.735	197
4000	$C_{10}H_{22}$	5-Methylnonane $(C_4H_9)_2CHCH_3$.	142.17		166.2	0.732	189
4001	$C_{10}H_{22}$	Tripropylmethane $(C_3H_7)_3CH$	142.17		161.7	$0.740^{16.2}$	210
4002	$C_{10}H_{22}O$	n-Decyl alcohol $CH_3(CH_2)_9OH$	158.17	7	231	0.829	
4003	$C_{10}H_{22}O$	3, 7-Dimethyl-n-octyl alcohol	158.17		118^{15}	0.849_4^0	
4004	$C_{10}H_{22}O$	Methylethylisohexyl carbinol	158.17		89^{14}	0.834_4^{16}	851
4005	$C_{10}H_{22}O$	Propyl-n-hexyl carbinol	158.17		211	0.826	
4006	$C_{10}H_{22}O$	n-Amyl ether $(C_5H_{11})_2O$	158.17		190	0.774	
4007	$C_{10}H_{22}O$	Isoamyl ether $[(CH_3)_2CHCH_2CH_2]_2O$.	158.17		172.2	$0.783^{11.8}$	172
4008	$C_{10}H_{22}O_3$	cis-Terpine hydrate .	190.15	117.1			1210
4009	$C_{10}H_{22}O_5S_2$	d-Glucosediethylmercaptal	286.30	128			
4010	$C_{10}H_{22}S$	Diisoamyl sulfide . .	174.23		216	0.843	443
4011	$C_{10}H_{23}N$	n-Decylamine $CH_3(CH_2)_9NH_2$.	157.19	17	218		
4012	$C_{10}H_{23}N$	Diisoamylamine.	157.19		190	0.767	281
4013	$C_{10}H_{25}Sb$	Pentaethyl stibine $(C_2H_5)_5Sb$	266.96		100		
4014	$C_{10}H_{30}O$	α(β)-Lactucerol.	166.23	181			
4015	$C_{10}H_{30}O_6$	Agaric acid . .	230.23	142 d.			
4016	$C_{11}H_6O_{10}$	Benzenepentacarboxylic acid	298.05	233 d.			
4017	$C_{11}H_7ClO$	α-Naphthoyl chloride $C_{10}H_7COCl$	190.51		297.5		
4018	$C_{11}H_7ClO$	β-Naphthoyl chloride $C_{10}H_7COCl$	190.51	43	306		
4019	$C_{11}H_7N$	α-Naphthylcyanide . . .	153.06	33.5	296.5	1.117_4^4	
4020	$C_{11}H_7N$	β-Naphthylcyanide	153.06	66.5	305	1.094_{60}^{60}	
4021	$C_{11}H_7NO_4$	Quinoline-2, 3-dicarboxylic acid	217.06	130 d.			
4022	$C_{11}H_7NO_4$	Quinoline-2, 4-dicarboxylic acid	217.06	246			
4023	$C_{11}H_8O$	α-Naphthaldehyde.	156.06		291.6	1.148	962
4024	$C_{11}H_8O$	β-Naphthaldehyde. . .	156.06	60.5		$1.078^{99.4}$	1133
4025	$C_{11}H_8N_2O_4$	Benzoylbarbituric acid	232.08	275			
4026	$C_{11}H_8O_2$	2-Hydroxy-α-naphthaldehyde	172.06	81	192^{27}		
4027	$C_{11}H_8O_2$	4-Hydroxy-α-naphthaldehyde	172.06	178			
4028	$C_{11}H_8O_3$	8-Hydroxy-α-naphthoic acid	188.06	169			
4029	$C_{11}H_8O_2$	α-Naphthoic acid	172.06	160	300		
4030	$C_{11}H_8O_2$	β-Naphthoic acid .	172.06	185	>300	1.077_4^{100}	
4031	$C_{11}H_8O_3$	3-Hydroxy-β-naphthoic acid	188.06	219			
4032	$C_{11}H_9N$	2-Phenylpyridine .	155.08		270	>1	
4033	$C_{11}H_9N$	3-Phenylpyridine	155.08		270.4	>1	
4034	$C_{11}H_9N$	4-Phenylpyridine .	155.08	78	275		
4035	$C_{11}H_9NO_2$	Aniluvitonic acid .	187.08	241			
4036	$C_{11}H_9NO_3$	Quininic acid.	203.08	280			
4037	$C_{11}H_9NO_6$	Hydrastininic acid	251.08	164			
4038	$C_{11}H_{10}$	α-Methylnaphthalene	142.08	−22	243	1.025	790
4039	$C_{11}H_{10}$	β-Methylnaphthalene	142.08	35.1	245	1.029	1062
4040	$C_{11}H_{10}I_3NO_3$	Thyroxin. .	584.88	250			
4041	$C_{11}H_{10}O$	Methyl α-naphthyl ether	158.08	< −10	258	$1.096_4^{12.9}$	831
4042	$C_{11}H_{10}O$	Methyl β-naphthyl ether	158.08	72	274		
4043	$C_{11}H_{10}O_2$	Ethyl phenylpropiolate	174.08		270 d.		
4043.1	$C_{11}H_{11}BrN_2O$	4-Bromoantipyrine	267.02	117			1181
4044	$C_{11}H_{11}N$	2, 4-Dimethylquinoline	157.09		264		
4045	$C_{11}H_{11}N$	2, 6-Dimethylquinoline	157.09	58	261		
4046	$C_{11}H_{11}N$	2, 7-Dimethylquinoline	157.09	61	265		
4047	$C_{11}H_{11}N$	3, 4-Dimethylquinoline	157.09	65	291		
4048	$C_{11}H_{11}N$	4, 6-Dimethylquinoline	157.09		256		
4049	$C_{11}H_{11}N$	4, 7-Dimethylquinoline	157.09	55	259		
4050	$C_{11}H_{11}N$	Methyl-α-naphthylamine	157.09		293		
4051	$C_{11}H_{11}NO$	Physostigmol . .	173.09	108			
4052	$C_{11}H_{11}NO_2$	Indole-2-propionic acid	189.09	136			
4053	$C_{11}H_{11}NO_4$	Ethyl o-nitrocinnamate	221.09	44			
4054	$C_{11}H_{11}NO_4$	Ethyl p-nitrocinnamate	221.09	141			
4055	$C_{11}H_{12}BrNO_3S$	p-Bromophenylmercapturic acid . .	318.08	153			
4056	$C_{11}H_{12}IN$	Quinaldine methiodide	285.03	190			
4057	$C_{11}H_{12}IN$	Quinoline ethiodide	285.03	157	d.		
4058	$C_{11}H_{12}N_2O$	Antipyrine.	188.11	109; 113	319^{174}		1307

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
4059	$C_{11}H_{12}N_2O_2$	4, 4-Phenylethylhydantoin	204.11	199			
4060	$C_{11}H_{12}N_2O_2$	*l*-Tryptophane	204.11	289			
4060 1	$C_{11}H_{12}O$	Benzylidene methyl ethyl ketone	160.09	37.5		0.987^{30}	1061
4061	$C_{11}H_{12}O_2$	Ethyl atropate	176.09		124.4^{16}	1.051	
4062	$C_{11}H_{12}O_2$	*trans*-Ethyl cinnamate	176.09	6.5	271	1.049	746
4063	$C_{11}H_{12}O_3$	3-Benzoylbutyric acid	192.09	126			
4064	$C_{11}H_{12}O_3$	Ethyl benzoylacetate	192.09		270 d.	1.122	704
4065	$C_{11}H_{12}O_3$	α-Ethyl phenylpyruvate	192.09	52	154.5^{15}		
4066	$C_{11}H_{12}O_3$	β-Ethyl phenylpyruvate	192.09		152^{15}		
4067	$C_{11}H_{12}O_3$	γ-Ethyl phenylpyruvate	192.09	79			
4068	$C_{11}H_{12}O_3$	Eugenol formate	192.09		150^{20}		
4069	$C_{11}H_{12}O_3$	Isoeugenol formate	192.09		160^{20}		
4071	$C_{11}H_{12}O_4$	Benzylsuccinic acid	208.09	161			
4072	$C_{11}H_{12}O_4$	α-Hydropiperic acid	208.09	76			
4073	$C_{11}H_{12}O_5$	Sinapic acid	224.09	191			
4074	$C_{11}H_{13}BrN_2O$	Antipyrine hydrobromide	269.03	150			
4075	$C_{11}H_{13}ClN_2O$	Antipyrine hydrochloride	224.57	160			
4076	$C_{11}H_{13}N$	Lilolidine	159.11		156^{15}		
4077	$C_{11}H_{13}NO_3$	Hydrastinine	207.11	116			
4077 1	$C_{11}H_{13}NO_3$	Ethyl hippurate	207.11	60.5	180	1.043^{23}	
4078	$C_{11}H_{13}NO_4$	Benzacetin	223.11	190			
4079	$C_{11}H_{13}NO_4$	Neurodin	223.11	87			
4080	$C_{11}H_{13}N_3O$	4-Aminoisoantipyrine	203.12	109			
4081	$C_{11}H_{13}N_3O$	Benzylcreatinine	203.12	225			
4082	$C_{11}H_{13}N_3O_6$	2, 4, 6-Trinitro-*tert*.-butyltoluene	283.12	97			
4083	$C_{11}H_{14}ClNO_3$	Hydrastinine hydrochloride	243.57	210			
4084	$C_{11}H_{14}N_2$	Calycanthine	174.12	243			
4085	$C_{11}H_{14}N_2$	Isocalycanthine	174.12	235			
4086	$C_{11}H_{14}N_2O$	Cytisine	190.12	153			1333
4087	$C_{11}H_{14}N_2O_2$	Antithermine (Acetopropionylphenylhydrazone)	206.12	108			
4088	$C_{11}H_{14}O$	Butyl phenyl ketone $C_6H_5COC_4H_9$	162.11		239.5		
4089	$C_{11}H_{14}O$	Isobutyl phenyl ketone	162.11		225	0.967	
4090	$C_{11}H_{14}O$	Isopropyl benzyl ketone	162.11		237	0.985^{0}_{4}	
4090 1	$C_{11}H_{14}O$	*p*-Methylbutyrophenone	162.11		252^{739}	1.026	683
4091	$C_{11}H_{14}O$	Propyl benzyl ketone	162.11		244	0.984^{0}_{4}	
4091 1	$C_{11}H_{14}O$	2, 4, 6-Trimethylacetophenone	162.11		240.5^{735}	0.975	661
4092	$C_{11}H_{14}O_2$	Eugenol methyl ether	178.11		249	1.055^{15}	
4093	$C_{11}H_{14}O_2$	Isoeugenol methyl ether	178.11		264	1.055	
4094	$C_{11}H_{14}O_2$	*p*-Isopropylphenylacetic acid	178.11	52			
4095	$C_{11}H_{14}O_2$	*n*-Butyl benzoate $C_6H_5CO_2C_4H_9$	178.11	−22.4	250.3	1.000^{20}	
4096	$C_{11}H_{14}O_2$	Benzyl butyrate $C_3H_7CO_2CH_2C_6H_5$	178.11		240	$1.016^{17.5}$	
4097	$C_{11}H_{14}O_2$	Benzyl isobutyrate	178.11		228	1.016^{18}	557
4097 1	$C_{11}H_{14}O_2$	*d*-β-Butyl benzoate	178.11		120^{20}	1.000	563
4098	$C_{11}H_{14}O_2$	Ethyl hydrocinnamate	178.11		249	1.015	571
4099	$C_{11}H_{14}O_2$	Isobutyl benzoate	178.11		237	1.002^{15}	
4100	$C_{11}H_{14}O_2$	Phenyl isovalerate	178.11		226		
4101	$C_{11}H_{14}O_3$	*n*-Butyl salicylate	194.11		155^{15}		
4102	$C_{11}H_{14}O_3$	Propyl anisate $p\text{-}CH_3OC_6H_4CO_2C_3H_7$	194.11		176^{45}	1.09	653
4103	$C_{11}H_{14}O_3$	Zingerone	194.11	41	188^{14}		
4104	$C_{11}H_{15}NO$	*p*-Diethylaminobenzaldehyde	177.12	41	174^{7}		
4105	$C_{11}H_{15}NO$	Isovaleroanilide	177.12	115			
4106	$C_{11}H_{15}NO$	*n*-Valeroanilide	177.12	49	267		
4107	$C_{11}H_{15}NO_2$	*p*-Diethylaminobenzoic acid	193.12	193			
4108	$C_{11}H_{15}NO_2$	Isobutyl *p*-aminobenzoate	193.12	65			
4109	$C_{11}H_{15}NO_2$	Methylacetophenetidine	193.12	40	300		
4110	$C_{11}H_{15}NO_2$	Triphenin	193.12	120			
4111	$C_{11}H_{15}NO_3$	Anhalamine	209.12	188			
4112	$C_{11}H_{15}NO_3$	Lactophenine	209.12	118			
4113	$C_{11}H_{15}NO_3$	Methoxyacetophenetidin	209.12	98			
4114	$C_{11}H_{15}NO_7S$	Hydrastinine bisulfate	305.19	216			
4115	$C_{11}H_{16}$	*n*-Amylbenzene $CH_3(CH_2)_4C_6H_5$	148.12		202.1	0.860	514
4116	$C_{11}H_{16}$	*tert*.-Amylbenzene	148.12		189.3	0.874^{15}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4117	$C_{11}H_{16}$	3, 5-Diethyltoluene	148.12		200	0.879	
4118	$C_{11}H_{16}$	Isoamylbenzene $(CH_3)_2CH(CH_2)_2C_6H_5$	148.12		194	0.885	
4119	$C_{11}H_{16}$	Pentamethylbenzene $(CH_3)_5C_6H$	148.12	53	230	$0.847^{107.2}_{4}$	1152
4120	$C_{11}H_{16}$	4-Propyl-*o*-xylene $C_3H_7C_6H_3(CH_3)_2$.	148.12	< −20	200		
4121	$C_{11}H_{16}$	4-Propyl-*m*-xylene $C_3H_7C_6H_3(CH_3)_2$	148.12	< −20	208.5		
4122	$C_{11}H_{16}$	2-Propyl-*p*-xylene $C_3H_7C_6H_3(CH_3)_2$	148.12	< −20	207		
4123	$C_{11}H_{16}Br_2N_2O_3$	*N*-2, 3-Dibromopropyl-5, 5-diethylbarbituric acid.... . .	383.97	125			
4124	$C_{11}H_{16}ClNO_3$	Anhalamine hydrochloride	245.59	258			
4125	$C_{11}H_{16}N_2O_2$	Pilocarpine	208.14	34			
4126	$C_{11}H_{16}N_2O_2$	Isopilocarpine... ..	208.14		261^{10}		
4127	$C_{11}H_{16}O$	*p*-Isoamylphenol .	164.12	93	255		
4128	$C_{11}H_{16}O$	Pentamethylphenol.	164.12	125	267		
4129	$C_{11}H_{16}O$	Benzyl *n*-butyl ether $C_6H_5CH_2OC_4H_9$.	164.12		216		
4130	$C_{11}H_{16}O$	Benzyl isobutyl ether	164.12		213	$0.928^{16.3}$	
4131	$C_{11}H_{16}O$	Phenyl isoamyl ether	164.12		225	0.920	545
4132	$C_{11}H_{16}O$	Thymyl methyl ether	164.12		216.2	0.954	
4133	$C_{11}H_{17}BrN_2O_2$	Isopilocarpine hydrobromide	289.06	147			
4134	$C_{11}H_{17}BrN_2O_2$	Pilocarpine hydrobromide	289.06	185			1333
4135	$C_{11}H_{17}ClN_2O_2$	Isopilocarpine hydrochloride	244.61	127			
4136	$C_{11}H_{17}ClN_2O_2$	Pilocarpine hydrochloride	244.61	196.7			1333
4137	$C_{11}H_{17}N$	*o*-Diethyltoluidine	163.14		206		
4138	$C_{11}H_{17}N$	*m*-Diethyltoluidine	163.14		228		
4139	$C_{11}H_{17}N$	*p*-Diethyltoluidine	163.14		229	$0.924^{15.5}$	
4140	$C_{11}H_{17}N$	Isoamylaniline.	163.14		254.5	0.928^{15}_{4}	
4141	$C_{11}H_{17}NO_3$	Mescaline....	211.14	151			
4142	$C_{11}H_{17}N_3O_5$	Isopilocarpine nitrate .	271.16	159			
4143	$C_{11}H_{17}N_3O_5$	Pilocarpine nitrate.	271.16	173			1333
4144	$C_{11}H_{17}O_2$	Citronellyl formate	181.13		98^{11}	0.884	453
4145	$C_{11}H_{18}N_2O_3$	5, 5-*n*-Butylisopropylbarbituric acid	226.16	210			
4146	$C_{11}H_{18}N_2O_3$	5, 5-Isoamylethylbarbituric acid	226.16	156			
4147	$C_{11}H_{18}O_2$	*d*-Bornyl formate	182.14		230	1.009	858
4148	$C_{11}H_{18}O_2$	Geranyl formate	182.14		98^{11}	0.909	491
4149	$C_{11}H_{18}O_2$	Isobornyl formate	182.14		100^{14}	1.017^{15}	
4150	$C_{11}H_{18}O_2$	Methyl geranate	182.14		117^{14}	0.922	961
4151	$C_{11}H_{18}O_2$	*d*, α-Terpinyl formate	182.14		136^{40}	0.999^{0}	
4152	$C_{11}H_{18}O_4$	Ethyl camphorate	214.14	87			
4153	$C_{11}H_{18}O_5$	Diethyl ethylacetylmalonate .	230.14		137.5^{20}	1.053	316
4154	$C_{11}H_{19}N_3O$	*d*-Camphor semicarbazone	209.17	238			
4155	$C_{11}H_{20}O$	Geranyl methyl ether	168.15		212		
4156	$C_{11}H_{20}O$	Methyl *d*-bornyl ether	168.15		195.3	0.916	1011
4157	$C_{11}H_{20}O_2$	*l*-Menthyl formate	184.15	9	217	0.936	
4158	$C_{11}H_{20}O_2$	Undecylenic acid	184.15	24.5	295	0.907	
4159	$C_{11}H_{20}O_3$	Isoamyl ethylacetoacetate	200.15		236 d.	0.951^{25}_{25}	
4160	$C_{11}H_{20}O_4$	Di-*n*-butyl malonate $CH_2(CO_2C_4H_9)_2$.	216.15		251.5	1.005^{0}_{0}	
4161	$C_{11}H_{20}O_4$	Diethyl diethylmalonate	216.15		223	0.990	282
4162	$C_{11}H_{20}O_4$	Isoamyl isopropyl malonate	216.15		140^{25}	0.958^{25}_{25}	314
4163	$C_{11}H_{20}O_5$	Glycerol 1, 2-dibutyrate	232.15		282		
4164	$C_{11}H_{21}NO_2$	Menthyl carbamate... ..	199.17	165	>200 d.		
4165	$C_{11}H_{22}$	α-Undecylene $CH_2{:}CH(CH_2)_8CH_3$	154.17		188	0.763	
4166	$C_{11}H_{22}$	β-Undecylene $CH_3CH{:}CH(CH_2)_7CH_3$	154.17		193	0.774^{15}_{15}	341
4167	$C_{11}H_{22}N_3O_4$	Clavine........... . .	260.19	263			
4168	$C_{11}H_{22}O$	Methyl *l*-menthyl ether	170.17			0.861	
4169	$C_{11}H_{22}O$	Undecylic aldehyde	170.17	−4	117^{18}	0.825^{23}	342
4170	$C_{11}H_{22}O$	Diamyl ketone $(C_5H_{11})_2CO$	170.17	14.6	226.3	0.826^{20}	
4171	$C_{11}H_{22}O$	Diisoamyl ketone.......	170.17		226		
4172	$C_{11}H_{22}O$	Methyl *n*-nonyl ketone.. .	170.17	12.1	228	0.826	312
4173	$C_{11}H_{22}O_2$	Umbellulic acid........ .	186.17	23	280		
4174	$C_{11}H_{22}O_2$	Undecylic acid $CH_3(CH_2)_{11}CO_2H$.	186.17	29.3	228^{160}		1066
4175	$C_{11}H_{22}O_2$	Ethyl pelargonate $C_8H_{17}CO_2C_2H_5$	186.17	−44.5	219	$0.866^{17.5}$	
4176	$C_{11}H_{22}O_2$	Methyl caprate $C_9H_{19}CO_2CH_3$	186.17	−18	224		
4177	$C_{11}H_{22}O_3$	Diisoamyl carbonate.. .. .	202.17		228.7	0.912^{15}	
4178	$C_{11}H_{24}$	*n*-Undecane $CH_3(CH_2)_9CH_3$.	156.18	−26.5	197	0.741	234

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4178.1	$C_{11}H_{24}$	ε-Ethylnonane	156.18		71^{18}	0.751^{19}	
4179	$C_{11}H_{24}O$	n-Undecyl alcohol $CH_3(CH_2)_9CH_2OH$	172.19	19	146^{30}	0.833	374
4179.1	$C_{11}H_{24}O$	n-Undecan-6-ol	172.19	16	235^{754}	0.833	
4180	$C_{11}H_{25}N$	n-Undecylamine $CH_3(CH_2)_9CH_2NH_2$	171.20	16.5	234		
4181	$C_{12}H_5N_7O_{12}$	Dipicrylamine $[2,4,6\text{-}(NO_2)_3C_6H_2]_2NH$	439.10	250 d.			
4182	$C_{12}H_6O_{12}$	Mellitic acid $C_6(CO_2H)_6$.	342.05	286			
4183	$C_{12}H_7N_3O_7$	Phenyl picrate . . .	305.08	153			
4184	$C_{12}H_8$	Acenaphthylene	152.06	93	275		1192
4185	$C_{12}H_8AsN$	Phenarsazine. .	241.03	310			
4185.1	$C_{12}H_8Br_2$	p, p′-Di-(bromophenyl)	311.89	164		1.897	
4186	$C_{12}H_8Cl_2$	1, 2-Dichloracenaphthene	222.98	115			
4187	$C_{12}H_8N_2$	Phenanthroline.	180.08	78.5	>360		
4188	$C_{12}H_8N_2$	Phenazine	180.08	171	>360		
4189	$C_{12}H_8N_2$	Phenazone	180.08	156	>360		
4190	$C_{12}H_8N_2$	Pseudophenanthroline	180.08	173			
4191	$C_{12}H_8N_2O_4$	Dinitroacenaphthene	244.08	206 d.			
4192	$C_{12}H_8N_2O_4$	o, o′-Dinitrodiphenyl	244.08	124			
4193	$C_{12}H_8N_2O_4$	m, m′-Dinitrodiphenyl	244.08	198			
4194	$C_{12}H_8N_2O_4$	p, p′-Dinitrodiphenyl	244.08	233			
4195	$C_{12}H_8O$	Diphenylene oxide	168.06	87	288		
4196	$C_{12}H_8O_2$	2-Phenylbenzoquinone	184.06	107			
4197	$C_{12}H_8O_4$	1, 8-Naphthalic acid	216.06	270			
4198	$C_{12}H_8O_4$	Bergaptene	216.06	188			
4199	$C_{12}H_8O_4$	Paracotoin	216.06	152			
4200	$C_{12}H_8O_4$	Xanthotoxin	216.06	146			
4201	$C_{12}H_8S_2$	Thianthrene .	216.19	160	366		
4202	$C_{12}H_9AsClN$	Phenarsazine chloride	277.50	193			
4203	$C_{12}H_9Br$	3-Bromoacenaphthene	232.99	51.2	336.4	1.437^{65}_4	
4204	$C_{12}H_9Cl$	3-Chloroacenaphthene	188.53	69.8	319		
4205	$C_{12}H_9Cl$	o-Chlorodiphenyl $o\text{-}ClC_6H_4C_6H_5$.	188.53	34	268		
4206	$C_{12}H_9Cl$	m-Chlorodiphenyl $m\text{-}ClC_6H_4C_6H_5$	188.53	89			
4207	$C_{12}H_9Cl$	p-Chlorodiphenyl $p\text{-}ClC_6H_4C_6H_5$.	188.52	75.5	282		
4208	$C_{12}H_9ClN_2$	m-Chloroazobenzene. .	216.54	67.5			
4209	$C_{12}H_9ClN_2$	p-Chloroazobenzene $p\text{-}ClC_6H_4NNC_6H_5$	216.54	89			
4210	$C_{12}H_9I$	3-Iodoacenaphthene .	280.00	65	180 d.	1.674^{62}_4	
4211	$C_{12}H_9N$	Carbazole . .	167.08	244.8	354.8		1333
4212	$C_{12}H_9NO_2$	o-Nitrodiphenyl $o\text{-}NO_2C_6H_4C_6H_5$	199.08	37	320		
4213	$C_{12}H_9NO_2$	m-Nitrodiphenyl $m\text{-}NO_2C_6H_4C_6H_5$	199.08	61			
4214	$C_{12}H_9NO_2$	p-Nitrodiphenyl $p\text{-}NO_2C_6H_4C_6H_5$	199.08	113	340		
4215	$C_{12}H_9NS$	Thiodiphenylamine	199.14	180	371 d.		
4216	$C_{12}H_9N_3O_2$	p-Nitroazobenzene	227.09	129.9			
4217	$C_{12}H_9N_3O_5$	2, 4-Dinitro-4′-hydroxydiphenylamine	275.09	190			
4218	$C_{12}H_{10}$	Acenaphthene	154.08	95	277.5	$1.024^{99.2}$	1127, 1193
4219	$C_{12}H_{10}$	Diphenyl $C_6H_5C_6H_5$	154.08	69.0	254.9	1.041	1105
4220	$C_{12}H_{10}AsCl$	Diphenyl arsine chloride	264.50	42.8	327 d.	1.583^{40}	
4221	$C_{12}H_{10}As_2$	Arsenobenzene $C_6H_5AsAsC_6H_5$	304.00	196			
4221.1	$C_{12}H_{10}ClI$	Diphenyliodonium chloride	316.47	d. 230		1.67	
4222	$C_{12}H_{10}Cl_2N_2$	Dichlorobenzidine $[2,4\text{-}Cl(NH_2)C_6H_3]_2$	253.01	163			
4223	$C_{12}H_{10}Cl_2N_2$	p, p-Dichlorbenzidine	253.01	60			
4224	$C_{12}H_{10}N_2$	Aribine .	182.09	237			
4225	$C_{12}H_{10}N_2$	Azobenzene $C_6H_5NNC_6H_5$	182.09	67	297.4	1.203	
4226	$C_{12}H_{10}N_2O$	Azoxybenzene	198.09	36		1.246	1031
4227	$C_{12}H_{10}N_2O$	p-Hydroxyazobenzene	198.09	152			
4228	$C_{12}H_{10}N_2O$	N-Nitrosodiphenylamine $(C_6H_5)_2NNO$. .	198.09	66.5			
4229	$C_{12}H_{10}N_2O$	p-Nitrosophenylaniline . .	198.09	143			
4230	$C_{12}H_{10}N_2O_2$	o, o′-Azophenol	214.09	172			
4231	$C_{12}H_{10}N_2O_2$	m, m′-Azophenol $HOC_6H_4NNC_6H_4OH$	214.09	205			
4232	$C_{12}H_{10}N_2O_2$	p, p′-Azophenol	214.09	215			
4233	$C_{12}H_{10}N_2O_2$	o-Nitrodiphenylamine	214.09	75			
4234	$C_{12}H_{10}N_2O_2$	p-Nitrodiphenylamine	214.09	133			
4235	$C_{12}H_{10}N_2O_2S$	Benzidinesulfone .	246.16	>350			
4236	$C_{12}H_{10}N_2O_3$	o, o′-Azoxyphenol	288.17	102			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4237	$C_{12}H_{10}N_2O_3$	p, p′-Azoxyphenol	288.17	156; 107			
4238	$C_{12}H_{10}O$	o-Phenylphenol $C_6H_5C_6H_4OH$	170.08	56	275		
4239	$C_{12}H_{10}O$	m-Phenylphenol $C_6H_5C_6H_4OH$	170.08	78	>300		
4240	$C_{12}H_{10}O$	p-Phenylphenol $C_6H_5C_6H_4OH$	170.08	165	308		
4241	$C_{12}H_{10}O$	Phenyl ether $C_6H_5OC_6H_5$.	170.08	26.9	259	1.072	1019
4242	$C_{12}H_{10}OS$	Diphenyl sulfoxide $(C_6H_5)_2SO$	202.14	70.5	340		
4243	$C_{12}H_{10}O_2$	o, o′-Diphenol $OHC_6H_4.C_6H_4OH$	186.08	109	326		
4244	$C_{12}H_{10}O_2$	o, p′-Diphenol $OHC_6H_4.C_6H_4OH$	186.08	161	342		
4245	$C_{12}H_{10}O_2$	m, m′-Diphenol $OHC_6H_4.C_6H_4OH$	186.08	123.5			
4246	$C_{12}H_{10}O_2$	p, p′-Diphenol $OHC_6H_4.C_6H_4OH$	186.08	272			
4247	$C_{12}H_{10}O_2$	α-Naphthyl acetate $CH_3CO_2C_{10}H_7$	186.08	44.8			
4248	$C_{12}H_{10}O_2$	β-Naphthyl acetate $CH_3CO_2C_{10}H_7$	186.08	68.5			
4249	$C_{12}H_{10}O_2S$	Diphenyl sulfone $(C_6H_5)_2SO_2$	218.14	129	377.8		
4250	$C_{12}H_{10}O_3S$	Phenyl benzenesulfonate	234.14	35			
4251	$C_{12}H_{10}O_4$	2, 2′-Diresorcinol	218.08	268			
4252	$C_{12}H_{10}O_4$	4, 4′-Diresorcinol	218.08	222			
4253	$C_{12}H_{10}O_4$	5, 5′-Diresorcinol	218.08	310			
4254	$C_{12}H_{10}O_4$	Piperic acid	218.08	217	220 d.		
4255	$C_{12}H_{10}O_4$	Quinhydrone	218.08	171			
4256	$C_{12}H_{10}O_4S$	4, 4′-Dihydroxydiphenylsulfone	250.14	239			
4257	$C_{12}H_{10}O_5$	Paracotoic acid	234.08	108			
4258	$C_{12}H_{10}O_5S_2$	Benzenesulfonic anhydride	298.21	90	240^{10} d		
4259	$C_{12}H_{10}P_2$	Phosphobenzene $C_6H_5P.PC_6H_5$	216.13	149			
4260	$C_{12}H_{10}S$	Diphenyl sulfide $(C_6H_5)_2S$	186.14		293	1.119^{15}_{15}	948
4261	$C_{12}H_{10}S_2$	Diphenyl disulfide $(C_6H_5)_2S_2$	218.21	61	310		
4262	$C_{12}H_{10}Se$	Diphenyl selenide $(C_6H_5)_2Se$	233.28		302	1.356^{15}	
4263	$C_{12}H_{10}Te$	Diphenyl telluride $(C_6H_5)_2Te$	281.58		320	1.556^{15}	800
4264	$C_{12}H_{11}As$	Diphenylarsine $(C_6H_5)_2AsH$	230.05		155^{37}		
4265	$C_{12}H_{11}AsO_2$	Diphenylarsonic acid $(C_6H_5)_2AsOOH$	262.05	178			
4266	$C_{12}H_{11}N$	o-Aminodiphenyl $C_6H_5C_6H_4NH_2$	169.09	45.5	299		
4267	$C_{12}H_{11}N$	2-Benzylpyridine	169.09		276		
4268	$C_{12}H_{11}N$	3-Benzylpyridine	169.09	34	286		
4269	$C_{12}H_{11}N$	4-Benzylpyridine	169.09		287		
4270	$C_{12}H_{11}N$	Diphenylamine $(C_6H_5)_2NH$	169.09	53	302	1.159	1333
4271	$C_{12}H_{11}NO$	m-Phenylaminophenol	185.09	82	340		
4272	$C_{12}H_{11}NO_2S$	Benzenesulfanilide	233.16	110			1183
4273	$C_{12}H_{11}N_3$	m-Aminoazobenzene	197.11	59			
4274	$C_{12}H_{11}N_3$	p-Aminoazobenzene $C_6H_5N_2C_6H_4NH_2$	197.11	126	>360		
4275	$C_{12}H_{11}N_3$	Diazoaminobenzene $C_6H_5N_2NHC_6H_5$	197.11	96	exp.		
4276	$C_{12}H_{11}N_3O_2$	o-Nitrobenzidine	229.11	143			
4277	$C_{12}H_{11}N_3O_2$	m-Nitrobenzidine	229.11	190			
4278	$C_{12}H_{11}P$	Diphenylphosphine $(C_6H_5)_2PH$	186.11		280	1.07^{15}	
4279	$C_{12}H_{12}$	1, 4-Dimethylnaphthalene	156.09	< −18	264.3	1.016	900
4280	$C_{12}H_{12}$	2, 3-Dimethylnaphthalene	156.09		266		
4281	$C_{12}H_{12}$	2, 6-Dimethylnaphthalene	156.09	111			
4282	$C_{12}H_{12}$	α-Ethylnaphthalene	156.09	< −14	258 d.	1.064^{15}_{15}	
4283	$C_{12}H_{12}$	β-Ethylnaphthalene	156.09	−19	251	1.008^{0}	
4284	$C_{12}H_{12}ClN$	Diphenylamine hydrochloride	205.56				1333
4285	$C_{12}H_{12}N_2$	p-Aminodiphenylamine	184.11	75	354		
4286	$C_{12}H_{12}N_2$	Benzidine $(p\text{-}NH_2C_6H_4)_2$	184.11	128.7	401.7		
4287	$C_{12}H_{12}N_2$	β-Benzidine	184.11	45	363		
4288	$C_{12}H_{12}N_2$	1, 1-Diphenylhydrazine $(C_6H_5)_2NNH_2$	184.11	36	220^{50}		
4289	$C_{12}H_{12}N_2$	Hydrazobenzene $C_6H_5NHNHC_6H_5$.	184.11	131	d.		
4290	$C_{12}H_{12}N_2O$	Harmalol	200.11	212 d.			
4291	$C_{12}H_{12}N_2O_3$	Luminal (5,5-Phenylethylbarbituric acid)	232.11	173			
4292	$C_{12}H_{12}N_2O_6S_2$	Benzene-o, o′-disulfonic acid	344.24	> 175 d.			
4293	$C_{12}H_{12}N_4$	Chrysoidine	212.12	117.5			1333
4294	$C_{12}H_{12}N_4$	p, p′-Diaminoazobenzene	212.12	241			
4295	$C_{12}H_{12}N_4O_4$	Urocanic acid	276.12	213 d.			
4296	$C_{12}H_{12}O$	Ethyl α-naphthyl ether	172.09	5.5	276.4	1.061	779
4297	$C_{12}H_{12}O$	Ethyl β-naphthyl ether	172.09	37.5	282	1.064	1071
4297.1	$C_{12}H_{12}O$	l-Methyl-α-naphthyl carbinol	172.09	47	116^{11}	1.115	
4298	$C_{12}H_{12}O_2$	Benzylideneacetylacetone	188.09		188^{15}		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4299	$C_{12}H_{12}O_2$	Allyl cinnamate .	188.09		286 d.	1.052^{25}_{25}	
4300	$C_{12}H_{12}O_3$	Benzoylacetylacetone . .	204.09	35	167^{22}	1.152^{15}_{15}	
4301	$C_{12}H_{12}O_6$	Brasilic acid	252 09	129			
4302	$C_{12}H_{12}O_6$	Phloroglucinol triacetate .	252 09	106			
4303	$C_{12}H_{12}O_6$	Pyrogallol triacetate	252.09	165			
4304	$C_{12}H_{13}N$	Dimethyl-α-naphthylamine ...	171.11		276	1.045^{15}_{15}	810
4305	$C_{12}H_{13}N$	Dimethyl-β-naphthylamine .	171 11	46	305	$1\ 028^{52.2}_{4}$	1081
4306	$C_{12}H_{13}N$	Ethyl α-naphthylamine ...	171 11		176^{15}	1 060	871
4307	$C_{12}H_{13}N$	Ethyl β-naphthylamine .. .	171 11		183^{15}	1 057	969
4308	$C_{12}H_{13}N$	2, 6, 8-Trimethylquinoline .	171 11	46	261 4		
4309	$C_{12}H_{13}NO_3$	Pyrantin	219 11	155			
4310	$C_{12}H_{13}N_3$	*p*, *p′*-Diaminodiphenylamine	199 12	158			
4311	$C_{12}H_{14}As_2Cl_2N_2O_2$	Arsphenamine .	438 96	160 d.			
4312	$C_{12}H_{14}IN$	Quinaldine ethiodide	299.05	234			
4313	$C_{12}H_{14}N_2O$	*p*-Tolylantipyrine	202.12	137			
4314	$C_{12}H_{14}N_4O_4S_2$	Benzidine-*o*, *o′*-disulfoneamide	342 27	278			
4315	$C_{12}H_{14}N_4O_6$	Desoxyamalic acid	310 14	260 s. d.			
4316	$C_{12}H_{14}N_4O_8$	Amalic acid (Tetramethylalloxantine).	342 14	221 d.			
4317	$C_{12}H_{14}O_2$	*n*-Propyl cinnamate	190 11		285 1	1.044^0	
4318	$C_{12}H_{14}O_3$	Eugenol acetate	206 11	31	282 4	1 084	665
4318 1	$C_{12}H_{14}O_3$	Ethyl *p*-methoxycinnamate .	206.11	52			1232
4319	$C_{12}H_{14}O_3$	Isoeugenol acetate	206 11	80	283		
4322	$C_{12}H_{14}O_4$	Apiol	222 11	29 5	294	1 015	1310
4323	$C_{12}H_{14}O_4$	Isoapiol	222 11	56	304	$1\ 197^{12}$	817
4324	$C_{12}H_{14}O_4$	Diethyl *o*-phthalate $o\text{-}C_6H_4(CO_2C_2H_5)_2$	222.11		296 1	1.122	607
4325	$C_{12}H_{15}N$	Carbazoline	173 12	99	297		
4326	$C_{12}H_{15}N$	Diallylaniline $C_6H_5N(CH_2CH{:}CH_2)_2$	173.12		245	0.954	
4327	$C_{12}H_{15}N$	Julolidine	173 12	40	280		
4328	$C_{12}H_{15}NO$	Benzoylpiperidine	189 12	48	184^{17}		
4329	$C_{12}H_{15}NO$	Naphthalanmorpholine	189 12	63	312		
4330	$C_{12}H_{15}NO_2$	Dipropionanilide $C_6H_5N(OCC_2H_5)_2$.	205 12	44	179.5^{30}		
4330.1	$C_{12}H_{15}NO_3$	Ethyl phenaceturate..........	221 12	79			1280
4331	$C_{12}H_{15}NO_3$	Anhalonidine..............	221 12	160			
4332	$C_{12}H_{15}NO_3$	Anhalonine	221 12	85 5			
4333	$C_{12}H_{15}NO_3$	Hydrocotarnine	221.12	55	100 d.		
4334	$C_{12}H_{15}NO_4$	Cotarnine	237 12	133			
4335	$C_{12}H_{16}N_2O$	Methylcytisine (Caulophylline)	204 14	137			
4336	$C_{12}H_{16}N_2O_4S$	Aniline sulfate $(C_6H_5NH_2)_2H_2SO_4$	284 20			1.377^4	
4337	$C_{12}H_{16}O$	Isoamyl phenyl ketone	176 12		242 5		
4338	$C_{12}H_{16}O$	Isobutyl benzyl ketone	176 12		250 5	$0\ 969^0_4$	
4339	$C_{12}H_{16}O_2$	Eugenol ethyl ether .	192 12		254	$1\ 021^{9\ 5}$	808
4340	$C_{12}H_{16}O_2$	Isoeugenol ethyl ether .	192.12	64			
4341	$C_{12}H_{16}O_2$	Pentamethylbenzoic acid	192 12	210 5			
4342	$C_{12}H_{16}O_2$	Amyl benzoate $C_6H_5CO_2C_5H_{11}$	192.12		d.	0 989	566
4343	$C_{12}H_{16}O_2$	Benzyl isovalerate.	192 12		136^{25}		
4344	$C_{12}H_{16}O_2$	Benzyl *d*-valerate	192 12		250^{730}	$0\ 982^{22}$	558
4345	$C_{12}H_{16}O_2$	Isoamyl benzoate .	192 12		262	0.993	
4345.1	$C_{12}H_{16}O_2$	Isopropyl hydrocinnamate	192 12		126^{11}	0.986^{25}	
4346	$C_{12}H_{16}O_2$	Thymyl acetate ..	192 12		243	$1\ 009^0$	
4347	$C_{12}H_{16}O_3$	*n*-Amyl salicylate $o\text{-}HOC_6H_4CO_2C_5H_{11}$	208 12		265	$1\ 065^{15}$	
4348	$C_{12}H_{16}O_3$	Butyl anisate $p\text{-}CH_3OC_6H_4CO_2C_4H_9$.	208 12		183^{40}	1 054	635
4349	$C_{12}H_{16}O_3$	Isoamyl salicylate .	208 12		273	$1\ 045^{25}_{25}$	
4350	$C_{12}H_{16}O_3$	Isobutyl anisate . .	208 12		170^{46}	1.052	634
4351	$C_{12}H_{16}O_3$	Guaiacyl valerate $C_4H_9CO_2C_6H_4OMe$.	208 12		265		
4352	$C_{12}H_{16}O_3$	Asaron	208 12	67	296	1.165	1333
4353	$C_{12}H_{16}O_3$	Elemicin	208 12		147^{10}	1 063	694
4354	$C_{12}H_{16}O_4$	Aspidinol........	224 12	161			
4355	$C_{12}H_{16}O_6$	Diethyl succinylsuccinate............ ..	256 12	128			
4356	$C_{12}H_{16}O_6$	*d*, β-Phenylglucoside..	256 12	175			
4357	$C_{12}H_{16}O_7$	Arbutin.	272 12	195			1333
4358	$C_{12}H_{17}AsN_2O_4$	Aniline arsenate $(C_6H_5NH_2)_2H_3AsO_4$	328 11	140			
4359	$C_{12}H_{17}NO$	*N*-*n*-Butylacetanilide............ ...	191.14		276.5		
4360	$C_{12}H_{17}NO$	Caproanilide $CH_3(CH_2)_4CONHC_6H_5$	191 14	95			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4361	$C_{12}H_{17}NO$	C-Diethylacetanilide	191.14	124			
4362	$C_{12}H_{17}NO_2$	Ethyl-*N*-phenacetine	207.14	38	298		
4363	$C_{12}H_{17}NO_2$	Ethyl-*o*-tolylurethane	207.14		255		
4364	$C_{12}H_{17}N_5O_9$	Lysine picrate.. .	375.17	252 d			
4365	$C_{12}H_{18}$	Hexamethylbenzene	162.14	166	265		
4365.1	$C_{12}H_{18}$	1-Methyl-3-*tert*.-amylbenzene	162.14		208	0.8673	
4366	$C_{12}H_{18}$	1, 2, 4-Triethylbenzene	162.14		218	0.882	**583**
4367	$C_{12}H_{18}$	1, 3, 5-Triethylbenzene	162.14		218	0.863	**565**
4367.1	$C_{12}H_{18}N_2O_4$	Rhamnose phenylhydrazone	254.16	159			
4367.2	$C_{12}H_{18}N_2O_5$	*d*, *α*-Glucosephenylhydrazone	270.16	160			
4367.3	$C_{12}H_{18}N_2O_5$	*d*, *β*-Glucosephenylhydrazone	270.16	141			
4367.4	$C_{12}H_{18}N_4O$	Phenylhydrazine hydrate	234.17	24			
4367.5	$C_{12}H_{18}N_4O_2$	Hexamethylenetetramineresorcinol.	250.17	200 d			
4367.6	$C_{12}H_{18}O$	Benzyl isoamyl ether.	178.14		237.5		
4367.7	$C_{12}H_{18}O$	Thymyl ethyl ether.	178.14		226.9	0.933^0_0	
4367.8	$C_{12}H_{18}O$	Mellithyl alcohol $(CH_3)_5C_6CH_2OH$	178.14	160.5			
4367.9	$C_{12}H_{18}O_3$	Phloroglucinol triethyl ether	210.14	43	175^{24}		
4368	$C_{12}H_{18}O_3$	Pyrogallol triethyl ether	210.14	39			
4368.1	$C_{12}H_{18}O_4$	Cascarillin..... .	226.14	205			
4368.2	$C_{12}H_{18}O_6$	Trimeric diacetyl	258.14	105	280.1		
4368.3	$C_{12}H_{18}O_6$	Diethyl 1, 1′-diacetylsuccinate	258.14	88		1.209 (st.) 1.176 (met.)	**1196, 1201**
4368.4	$C_{12}H_{18}O_6$	Triethyl aconitate..	258.14		253^{750}	1.106	**454**
4368.41	$C_{12}H_{18}O_8$	Diethyl diacetyltartrate	290.14	68	170^{15}	1.109^{71}	
4368.5	$C_{12}H_{19}Br_3O_2$	Bromal *d*-borneolate.	434.89	109		1.868^{0}	
4368.6	$C_{12}H_{19}ClO_2$	*d*-Bornyl chloroacetate	230.60		147^{30}		
4368.7	$C_{12}H_{19}Cl_3O_2$	Chloral-*d*-borneolate	301.52	56			
4368.8	$C_{12}H_{19}N$	*n*-Dipropylaniline $C_6H_5N(C_3H_7)_2$	177.15		241	0.910	
4368.9	$C_{12}H_{20}N_2O_3$	Isoamylisopropylbarbituric acid	240.17	175			
4369	$C_{12}H_{20}N_2O_3$	Isoamylpropylbarbituric acid .	270.17	132			
4369.1	$C_{12}H_{20}N_4O_7$	Hexamethylenetetraminemethylene citrate	332.19	175			
4369.2	$C_{12}H_{20}O$	Ballanophorin. . .	180.15	56			
4370	$C_{12}H_{20}O$	Homophorone	180.15		210^{625}	0.886	**530**
4371	$C_{12}H_{20}O_2$	Geranylacetic acid	196.15		179^{19}	0.938	**516**
4372	$C_{12}H_{20}O_2$	*dl*-Bornyl acetate	196.15		114^{22}	0.985	**483**
4373	$C_{12}H_{20}O_2$	*d*-Bornyl acetate	196.15	29	226	0.991^{15}	**994**
4374	$C_{12}H_{20}O_2$	Geranyl acetate	196.15		242	0.917^{15}	**493**
4375	$C_{12}H_{20}O_2$	Isobornyl acetate	196.15		89^{9}	0.981	**1010**
4375.1	$C_{12}H_{20}O_2$	Isopulegyl acetate	196.15		103^{14}	0.935^{18}	**934**
4376	$C_{12}H_{20}O_2$	*l*-Linalyl acetate	196.15		220	0.895	**414**
4377	$C_{12}H_{20}O_2$	Neryl acetate	196.15		134^{25}	0.916^{15}	
4378	$C_{12}H_{20}O_2$	*dl*, *α*-Terpinyl acetate	196.15	< -50	220 d.	0.957	
4379	$C_{12}H_{20}O_2$	*d* (*l*), *α*-Terpinyl acetate	196.15		140^{40}	0.983^0_0	
4380	$C_{12}H_{20}O_5$	Diethyl 1-ethyl-1′-acetylsuccinate	244.15		263	$1.064^{18}_{17.5}$	
4381	$C_{12}H_{20}O_7$	Triethyl citrate .	276.15		294	1.137	**409**
4382	$C_{12}H_{20}O_{10}$	Maltosan..	324.15	150 (?)			
4383	$C_{12}H_{21}ClO_2$	*l*-Menthyl chloroacetate	232.62	38	137^{12}	1.056	
4384	$C_{12}H_{21}N_3$	Kyanpropine... ...	207.19	116			
4385	$C_{12}H_{22}O$	Ethyl *d*-bornyl ether	182.17		205	0.901	**1023**
4386	$C_{12}H_{22}O$	Hexenyl ether	182.17		118		
4387	$C_{12}H_{22}O_2$	*d*-Citronellyl acetate	198.17		121^{15}	0.903^{18}_4	**402**
4388	$C_{12}H_{22}O_2$	*l*-Menthyl acetate $(HOCHCO_2C_4H_9)_2$	198.17		227	0.919	**418**
4389	$C_{12}H_{22}O_3$	Lanolic acid..	214.17	77			
4390	$C_{12}H_{22}O_3$	*l*-Menthyl glycollate	214.17	87			
4391	$C_{12}H_{22}O_4$	Diisoamyl oxalate	230.17		265	0.968^{11}	
4392	$C_{12}H_{22}O_6$	Di-*n*-butyl *d*-tartrate .	262.17	22.5	203^{18}	1.098^{15}	
4393	$C_{12}H_{22}O_6$	Diisobutyl *d*-tartrate	262.17	69	325		
4393.1	$C_{12}H_{22}O_6$	Diisobutyl *l*-tartrate	262.17	74	185^{21}	1.029^{79}	
4394	$C_{12}H_{22}O_{11}$	Lactose. . .	342.17	201.6	d.	1.525	**1229**
4395	$C_{12}H_{22}O_{11}(H_2O)$	Maltose	360.19			1.540	**1333**
4396	$C_{12}H_{22}O_{11}$	Saccharose . .	342.17	186		1.588^{15}_4	**1242**
4397	$C_{12}H_{22}O_{11}$	Trehalose $(2H_2O)$	342.17	210			**1195**

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4398	$C_{12}H_{23}ClO$	Lauryl chloride $CH_3(CH_2)_{10}COCl$	218 64	−17	145^{18}		
4399	$C_{12}H_{23}N$	Lauronitrile $CH_3(CH_2)_{10}CN$	181 19	4	198^{100}	0.827^{15}	
4400	$C_{12}H_{24}$	n-Dodecylene $CH_2{:}CH(CH_2)_9CH_3$	168 19	−31 5	96^{15}	0.762^{15}_{4}	
4401	$C_{12}H_{24}N_2O_{10}$	d-Glucosealdazine	356 20	100			
4402	$C_{12}H_{24}O$	n-Amyl hexyl ketone $C_5H_{11}COC_6H_{13}$	184 19	9	112^{9}		
4403	$C_{12}H_{24}O$	Ethylmenthol	184 19		85^{4}	0.904^{17}	
4404	$C_{12}H_{24}O$	l-Ethyl menthyl ether	184 19		212 9	0.854	918
4405	$C_{12}H_{24}O$	Lauric aldehyde $CH_3(CH_2)_{10}CHO$	184 19	44 5	185^{100}		
4406	$C_{12}H_{24}O_2$	Lauric acid $CH_3(CH_2)_{10}CO_2H$	200 19	48 0	225^{100}	0 883	1123
4407	$C_{12}H_{24}O_2$	n-Decyl acetate $CH_3CO_2C_{10}H_{21}$	200 19		191 5		1082
4408	$C_{12}H_{24}O_2$	Ethyl n-caprate $C_9H_{19}CO_2C_2H_5$	200 19		245	0 862	
4409	$C_{12}H_{24}O_3$	n-Parabutyraldehyde	216 19		100^{35}		
4410	$C_{12}H_{25}NO$	Lauramide $CH_3(CH_2)_{10}CONH_2$	199 20	102	$200^{12\ 5}$		
4411	$C_{12}H_{26}$	n-Dodecane $CH_3(CH_2)_{10}CH_3$	170 20	−12	216	0 768	255
4412	$C_{12}H_{26}$	5-Propylnonane $(C_4H_9)_2CHC_3H_7$	170 20		205	0 756	268
4413	$C_{12}H_{26}$	2, 4, 5, 7-Tetramethyloctane	170 20		210		
4414	$C_{12}H_{26}O$	n-Amylhexyl carbinol	186 20	30	119^{9}		
4415	$C_{12}H_{26}O$	n-Dodecyl alcohol $CH_3(CH_2)_{10}CH_2OH$	186 20	24	259	0.831	
4416	$C_{12}H_{26}O$	n-Hexyl ether $(C_6H_{13})_2O$	186 20		208 8		
4417	$C_{12}H_{27}N$	Dodecylamine $C_{12}H_{25}NH_2$	185 22	28	135^{15}		
4418	$C_{12}H_{27}N$	Tri-n-butylamine $(C_4H_9)_3N$	185 22		214	$0\ 778^{20}_{20}$	
4419	$C_{12}H_{27}N$	Triisobutylamine $[(CH_3)_2CHCH_2]_3N$	185 22	−21 8	191 5	$0\ 766^{25}_{25}$	294
4420	$C_{12}H_{28}N_2O_4$	Ethylenediamine isovalerate	264 23	129			
4421	$C_{13}H_7Br_3O_3$	Tribromosalol	450 80	195			
4422	$C_{13}H_8Cl_2O$	p, p′-Dichlorobenzophenone	250 98	145			
4423	$C_{13}H_8N_2O_5$	p, p′-Dinitrobenzophenone	272 08	190			
4424	$C_{13}H_8N_6O_9$	o, o′, p, p′-Tetranitrodiphenylurea	392 11	189			
4425	$C_{13}H_8O$	Fluorenone	180 06	84	341 5		
4426	$C_{13}H_8O$	Pyrene ketone	180 06	142			
4427	$C_{13}H_8O_2$	Xanthone	196 06	174	351		
4428	$C_{13}H_8O_3S$	Benzophenonesulfone	244 13	187			
4429	$C_{13}H_8O_4$	Euxanthone	228 06	240			
4430	$C_{13}H_9BrO_2$	p-(p-Bromophenyl) benzoic acid	276 99	194			
4431	$C_{13}H_9ClO$	o-Chlorobenzophenone	216 53	45 5	330		
4432	$C_{13}H_9ClO$	m-Chlorobenzophenone	216 53	83			
4433	$C_{13}H_9ClO$	p-Chlorobenzophenone	216 53	78	> 300		
4434	$C_{13}H_9N$	Acridine	179 08	108	346		
4435	$C_{13}H_9N$	α-Naphthoquinoline	179 08	52	351		
4436	$C_{13}H_9N$	β-Naphthoquinoline	179 08	93	351		
4437	$C_{13}H_9N$	Phenanthradine	179 08	104	360		
4438	$C_{13}H_9NO$	9-Acridone	195 08	354			
4439	$C_{13}H_{10}$	Fluorene	166 08	116	295		
4440	$C_{13}H_{10}AsN$	Diphenylcyanoarsine $(C_6H_5)_2AsCN$	255 05	30			
4441	$C_{13}H_{10}Cl_2$	Benzophenone chloride	236 99		305	$1\ 235^{18\ 5}$	
4442	$C_{13}H_{10}Cl_2$	m, m′-Dichlorodiphenylmethane	236 99	8	318	$1\ 234^{21}_{21}$	
4443	$C_{13}H_{10}Cl_2$	p, p′-Dichlorodiphenylmethane	236 99	55	210^{15}		
4444	$C_{13}H_{10}N_2O_3$	Benzeneazosalicylic acid	242 09	218 d.			
4445	$C_{13}H_{10}O$	p-Diphenylaldehyde $p\text{-}C_6H_5C_6H_4CHO$	182 08	60			
4446	$C_{13}H_{10}O$	Fluorenol	182 08	156			
4447	$C_{13}H_{10}O$	α-Benzophenone $(C_6H_5)_2CO$	182 08	48 5	305 4	$1\ 083^{53\ 5}$	
4448	$C_{13}H_{10}O$	β-Benzophenone	182 08	26 5	306	$1\ 108^{23}$	1014
4449	$C_{13}H_{10}O$	γ-Benzophenone	182 08	45 48			
4450	$C_{13}H_{10}O$	δ-Benzophenone	182 08	−51			
4451	$C_{13}H_{10}O$	Xanthene	182 08	100.5	315		
4452	$C_{13}H_{10}O_2$	o-Hydroxybenzophenone	198 08	41	250^{530}		
4453	$C_{13}H_{10}O_2$	m-Hydroxybenzophenone	198 08	116			
4454	$C_{13}H_{10}O_2$	p-Hydroxybenzophenone	198 08	134			
4455	$C_{13}H_{10}O_2$	o-Phenylbenzoic acid	198 08	111	344		
4456	$C_{13}H_{10}O_2$	m-Phenylbenzoic acid	198 08	161			
4457	$C_{13}H_{10}O_2$	p-Phenylbenzoic acid	198 08	219			
4458	$C_{13}H_{10}O_2$	Phenyl benzoate $C_6H_5CO_2C_6H_5$	198 08	70	314	1.235^{21}	
4459	$C_{13}H_{10}O_3$	2, 5-Dihydroxybenzophenone	214 08	122			
4460	$C_{13}H_{10}O_3$	2, 2′-Dihydroxybenzophenone	214.08	59	340		

No.	Formula	Name	Mol wt.	M. P.	B. P.	d	R. I. No.
4461	$C_{13}H_{10}O_3$	2, 3′-Dihydroxybenzophenone	214.08	126			
4462	$C_{13}H_{10}O_3$	2, 4′-Dihydroxybenzophenone	214.08	144			
4463	$C_{13}H_{10}O_3$	3, 4′-Dihydroxybenzophenone	214.08	197			
4464	$C_{13}H_{10}O_3$	4, 4′-Dihydroxybenzophenone	214.08	210			
4465	$C_{13}H_{10}O_3$	*o*-Phenoxybenzoic acid .	214.08	114.5	355 d.		
4466	$C_{13}H_{10}O_3$	Diphenyl carbonate $(C_6H_5O)_2CO$	214.08	81	302		
4467	$C_{13}H_{10}O_3$	Salol *o*-$HOC_6H_4CO_2C_6H_5$	214.08	43	173^{12}	1.250	
4468	$C_{13}H_{10}O_4$	2, 6, 2′-Trihydroxybenzophenone	230.08	133			
4469	$C_{13}H_{10}O_5$	Pimpinellin ...	246.08	119			
4470	$C_{13}H_{10}O_6$	Maclurin.	262.08	220 d			
4471	$C_{13}H_{10}O_8$	Sordidin	294.08	210			
4472	$C_{13}H_{10}S$	Thiobenzophenone $(C_6H_5)_2CS$	198.14	146.5			
4473	$C_{13}H_{11}N$	Benzylideneaniline $C_6H_5N.CHC_6H_5$	181.09	54	300		
4474	$C_{13}H_{11}N$	5, 10-Dihydroacridine	181.09	169			
4475	$C_{13}H_{11}NO$	*o*-Aminobenzophenone	197.09	108			
4476	$C_{13}H_{11}NO$	*m*-Aminobenzophenone	197.09	86			
4477	$C_{13}H_{11}NO$	*p*-Aminobenzophenone	197.09	124			
4478	$C_{13}H_{11}NO$	Benzanilide $C_6H_5NHCOC_6H_5$	197.09	161		1.321^4	
4479	$C_{13}H_{11}NO$	Benzophenoneoxime $(C_6H_5)_2C{:}NOH$	197.09	142			
4480	$C_{13}H_{11}NO$	*N*-Phenylformanilide $(C_6H_5)_2NOCH$.	197.09	74	220	1.230	
4481	$C_{13}H_{11}NO_2$	*o*-Benzoylaminophenol	213.09	167 d.			
4482	$C_{13}H_{11}NO_2$	*m*-Benzoylaminophenol .	213.09	174			
4483	$C_{13}H_{11}NO_2$	*p*-Benzoylaminophenol	213.09	227			
4484	$C_{13}H_{11}NO_2$	*p*-Nitrodiphenylmethane	213.09	31			
4485	$C_{13}H_{11}NO_2$	Salicylanilide *o*-$OHC_6H_4CONHC_6H_5$.	213.09	135			
4486	$C_{13}H_{11}NO_3$	*p*-Aminosalol	229.09	152			
4487	$C_{13}H_{11}NO_4$	Gallanilide	245.09	205			
4488	$C_{13}H_{11}N_3$	2, 8-Diaminoacridine	209.11	284			
4489	$C_{13}H_{11}O_5$	Gelsemic acid	247.09	206			
4490	$C_{13}H_{12}$	Diphenylmethane $(C_6H_5)_2CH_2$	168.09	27	262	1.006	**1030**
4491	$C_{13}H_{12}$	*o*-Phenyltoluene $CH_3C_6H_4C_6H_5$	168.09		260		
4492	$C_{13}H_{12}$	*m*-Phenyltoluene $CH_3C_6H_4C_6H_5$	168.09		277	1.031^0	
4493	$C_{13}H_{12}$	*p*-Phenyltoluene $CH_3C_6H_4C_6H_5$	168.09	−3	267	1.015^{27}	
4494	$C_{13}H_{12}N_2$	Benzaldehyde phenylhydrazone	196.11	156			
4495	$C_{13}H_{12}N_2O$	1-Benzoyl-1-phenylhydrazine	212.11	70			
4496	$C_{13}H_{12}N_2O$	1-Benzoyl-2-phenylhydrazine	212.11	168			
4497	$C_{13}H_{12}N_2O$	*o*, *o*′-Diaminobenzophenone	212.11	135			
4498	$C_{13}H_{12}N_2O$	*m*, *m*′-Diaminobenzophenone	212.11	174			
4499	$C_{13}H_{12}N_2O$	*p*, *p*′-Diaminobenzophenone	212.11	237			
4500	$C_{13}H_{12}N_2O$	1, 2-Diphenylurea $CO(NHC_6H_5)_2$	212.11	235	260		**1329**
4501	$C_{13}H_{12}N_2O$	1, 1-Diphenylurea $(C_6H_5)_2NCONH_2$.	212.11	189			
4502	$C_{13}H_{12}N_2O$	Harmine	212.11	257 d.			
4503	$C_{13}H_{12}N_2O_2$	*o*-Nitrobenzylaniline	228.11	44; 57			
4504	$C_{13}H_{12}N_2S$	1, 2-Diphenylthiourea	228.17	154	d.	1.321^4	
4505	$C_{13}H_{12}O$	*o*-Benzylphenol $C_6H_5CH_2C_6H_4OH$	184.09	21	312		
4506	$C_{13}H_{12}O$	*p*-Benzylphenol $C_6H_5CH_2C_6H_4OH$..	184.09	84	322		
4507	$C_{13}H_{12}O$	Diphenyl carbinol $(C_6H_5)_2CHOH$	184.09	68	298.5		
4508	$C_{13}H_{12}O$	Benzyl phenyl ether $C_6H_5OCH_2C_6H_5$	184.09	39	287		
4509	$C_{13}H_{12}O_3S$	Phenyl-*p*-toluenesulfonate	248.16	96			
4512	$C_{13}H_{13}N$	Benzylaniline $C_6H_5NHCH_2C_6H_5$	183.11	37	300	1.038^{25}_{4}	
4513	$C_{13}H_{13}N$	*N*-Methyldiphenylamine $(C_6H_5)_2NCH_3$.	183.11	−7.6	293.4	1.047^{26}_{26}	
4514	$C_{13}H_{13}NO$	*m*-(*o*-Tolylamino) phenol ..	199.11		375		
4515	$C_{13}H_{13}NO$	*p*-(*m*-Tolylamino) phenol	199.11	91	350		
4517	$C_{13}H_{13}NO_2S$	Toluene-*p*-sulfoneanilide	247.17	103			
4518	$C_{13}H_{13}N_3$	Diphenylguanidine......	211.12	148			
4519	$C_{13}H_{14}N_2$	*o*, *p*′-Diaminodiphenylmethane	198.12	88			
4520	$C_{13}H_{14}N_2$	*m*, *m*′-Diaminodiphenylmethane	198.12	48			
4521	$C_{13}H_{14}N_2$	*m*, *p*′-Diaminodiphenylmethane	198.12	90			
4522	$C_{13}H_{14}N_2$	*p*, *p*′-Diaminodiphenylmethane	198.12	89			
4523	$C_{13}H_{14}N_2$	1-Phenyl-2-benzylhydrazine .	198.12	26			
4524	$C_{13}H_{14}N_2O$	Harmaline...........................	214.12	238			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4525	$C_{13}H_{14}N_2O_2$	Analgen (5-Acetylamino-8-ethoxyquinoline)	230 12	155			
4526	$C_{13}H_{14}N_4S$	1, 2-Di(*p*-aminophenyl) thiourea	258 21	195			
4526 1	$C_{13}H_{14}O_2$	Isobutyl phenylpropiolate	202 11		176^{12}	1.158^{25}	
4527	$C_{13}H_{14}O_4$	Drimine	234 11	256			
4528	$C_{13}H_{15}Cl_3N_2O_3$	Chloralantipyrine	353 51	68			
4529	$C_{13}H_{15}N$	2, 5, 6, 8-Tetramethylquinoline	185 12	20	300		
4530	$C_{13}H_{16}IN$	2, 4-Dimethylquinoline ethiodide	313 06	225			
4530 1	$C_{13}H_{16}N_2O$	4-Ethyl antipyrine	216 14	68			1237
4530 2	$C_{13}H_{16}N_2O$	1-Phenyl-2-propyl-3-methylpyrazolone	216 14	93			1262
4530 3	$C_{13}H_{16}O$	Benzalpinacoline	188 12	39.5		0.939^{60}	1048
4531	$C_{13}H_{16}O_3$	Ethyl benzylacetoacetate	220 12		290 d.	$1\ 036^{15}_{14}$	
4532	$C_{13}H_{16}O_3$	Isoeugenol propionate	220 12		292		
4533	$C_{13}H_{16}O_4$	Ethyl phenylmalonate	236 12		285 d.	$1\ 095^{25}_{25}$	
4534	$C_{13}H_{16}O_7$	*l*-Helicin	284.12	175			
4535	$C_{13}H_{16}O_7$	Salinigrin	284 12	195			
4536	$C_{13}H_{17}NO_4$	Thermodin	251.14	88			1333
4537	$C_{13}H_{17}N_3O$	Pyramidon	231 16	108			
4538	$C_{13}H_{18}BrNO_2$	Phenoval	300 06	150			
4539	$C_{13}H_{18}N_2O$	Eseroline	218.16	127			
4541	$C_{13}H_{18}N_4O_6S$	Hexamethylenetetramine salicylsulfonic acid (Hexal)	358.24	190 d.			
4542	$C_{13}H_{18}O$	Phenyl hexyl ketone $C_6H_5COC_6H_{13}$.	190.14	17	271 5		
4543	$C_{13}H_{18}O_2$	Eugenol propyl ether	206 14		270.5	1 002	
4544	$C_{13}H_{18}O_2$	Phenyl heptylate $C_6H_{13}CO_2C_6H_5$	206 14		282 3	$0\ 982^{15}_{15}$	
4545	$C_{13}H_{18}O_3$	Isoamyl anisate	222 14		188^{30}	1 040	638
4546	$C_{13}H_{18}O_7$	Methylarbutin	286 14	175			
4547	$C_{13}H_{18}O_7$	Salicin .	286 14	201.5	240	1.434^{26}	
4548	$C_{13}H_{18}O_8$	Calmatambetin	302.14	148			
4549	$C_{13}H_{19}NO$	Heptanilide $CH_3(CH_2)_5CONHC_6H_5$	205.15	71			
4550	$C_{13}H_{19}NO_2$	Benzalaminoacetal	221 15		220^{150}		
4551	$C_{13}H_{19}NO_2$	Dioscorine	221 15	43 5			
4552	$C_{13}H_{19}NO_3$	Pellotine	237.15	111			1333
4553	$C_{13}H_{19}NO_9$	Gynocardine	333 15	162			
4554	$C_{13}H_{19}O_8$	Aucubine	303.15	181			
4555	$C_{13}H_{20}ClNO_2$	Dioscorine hydrochloride	257.62	204			
4556	$C_{13}H_{20}ClNO_3$	Gujasanol (Diethylaminoacetic acid guaiacol hydrochloride)	273 62	184			
4557	$C_{13}H_{20}N_2O_2$	Novocaine	236.17	60			
4558	$C_{13}H_{20}N_2O_2(2H_2O)$	Novocaine	272.19	51			
4559	$C_{13}H_{20}O$	α-Ionone	192.15		$147\ 5^{28}$	0 930	988
4560	$C_{13}H_{20}O$	β-Ionone	192.15		140^{18}	0.944	667, 951
4561	$C_{13}H_{20}O$	Irone	192.15		144^{16}	0.939	605
4562	$C_{13}H_{20}O$	Lactucol	192.15	160			
4563	$C_{13}H_{20}O$	Pseudoionone	192.15		170^{28}	0 897	1001
4564	$C_{13}H_{20}O_2$	Galbanic acid	208 15	156			
4565	$C_{13}H_{21}ClN_2O_2$	Novocaine hydrochloride	272 64	156			
4566	$C_{13}H_{21}ClN_2O_2$	Procaine	272 64	155			
4567	$C_{13}H_{21}N$	*N*-Ethyl-isoamylaniline	191.17		262		
4568	$C_{13}H_{21}NO_4$	Meteloidine	255 17	141			
4569	$C_{13}H_{22}BrNO_4$	Meteloidine hydrobromide	336 09	250			
4570	$C_{13}H_{22}N_2O_3$	Ethylheptylbarbituric acid	254.19	119			
4571	$C_{13}H_{22}O$	Zeorin	194.17	251			
4572	$C_{13}H_{22}O_2$	*d*-Bornyl propionate	210 27		110^{11}	0.979^{15}	857
4573	$C_{13}H_{22}O_3$	*l*-Menthyl pyruvate	226.17		140^{22}	0 985	
4574	$C_{13}H_{22}O_7$	Taxicatin	290.17	171			
4575	$C_{13}H_{24}NO_2$	Cuscohygrine	226.19		170^{23}		
4576	$C_{13}H_{24}O$	Allyl *l*-menthyl ether	196.19		104^{13}	0.876	
4577	$C_{13}H_{24}O$	Geranylacetone	196.19		139^{19}		
4578	$C_{13}H_{24}O_2$	*l*-Menthyl propionate	212.19		118^{15}	0 918	
4579	$C_{13}H_{24}O_3$	*l*-Menthyl *dl*-lactate	228.19	32	142^{15}	0.984	
4580	$C_{13}H_{24}O_4$	Brassylic acid	244.19	114			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4580.1	$C_{13}H_{24}O_4$	Di-*l*-amyl malonate	244.19		154^{13}	0.962^{26}	
4581	$C_{13}H_{26}$	Tridecylene	182.20		232.7	0.845^0	
4582	$C_{13}H_{26}O_2$	Tridecylic acid $CH_3(CH_2)_{11}CO_2H$	214.20	51	236^{100}		
4583	$C_{13}H_{26}O_2$	Isoamyl caprylate	214.20		136^{10}		
4584	$C_{13}H_{26}O_2$	Methyl laurate $C_{11}H_{23}CO_2CH_3$	214.20	5	148^{18}		
4585	$C_{13}H_{28}$	Dipropylhexylmethane $(C_3H_7)_2CHC_6H_{13}$	184.22		221.2	$0.765^{14.4}_4$	299
4586	$C_{13}H_{28}$	Tributylmethane $(C_4H_9)_3CH$	184.22			0.760	300
4587	$C_{13}H_{28}$	*n*-Tridecane $CH_3(CH_2)_{11}CH_3$	184.22	-6.2	234	0.757	908
4588	$C_{13}H_{28}O$	Di-*n*-hexylcarbinol $(C_6H_{13})_2CHOH$	200.22	42			
4589	$C_{13}H_{28}O$	*n*-Tridecyl alcohol $CH_3(CH_2)_{11}CH_2OH$	200.22	30.5	156^{15}	0.822^{31}_4	
4590	$C_{13}H_{29}N$	Tridecylamine $CH_3(CH_2)_{11}CH_2NH_2$	199.23	27	265		
4591	$C_{14}H_2Cl_8$	Octachloroanthracene	453.68	>350			
4592	$C_{14}H_3Cl_7$	Heptachloroanthracene	419.23	>350			
4593	$C_{14}H_4Cl_4O_2$	1, 2, 3, 4-Tetrachloroanthraquinone.	345.86	191			
4594	$C_{14}H_4Cl_4O_2$	β-Tetrachloroanthraquinone	345.86	330			
4595	$C_{14}H_4Cl_6$	Hexachloroanthracene	384.78	330			
4596	$C_{14}H_6Cl_2O_2$	α-1, 2-Dichloroanthraquinone	276.96	161			
4597	$C_{14}H_6Cl_2O_2$	β-1, 2-Dichloroanthraquinone	276.96	207			
4598	$C_{14}H_6Cl_2O_2$	1, 4-Dichloroanthraquinone	276.96	187.5			
4599	$C_{14}H_6Cl_2O_2$	1, 5-Dichloroanthraquinone	276.96	232			
4600	$C_{14}H_6Cl_2O_2$	1, 6-Dichloroanthraquinone	276.96	204			
4601	$C_{14}H_6Cl_2O_2$	1, 8-Dichloroanthraquinone	276.96	199			
4602	$C_{14}H_6Cl_2O_2$	2, 3-Dichloroanthraquinone	276.96	267			
4603	$C_{14}H_6Cl_2O_2$	2, 6-Dichloroanthraquinone	276.96	282			
4604	$C_{14}H_6Cl_2O_2$	2, 7-Dichloroanthraquinone	276.96	211			
4605	$C_{14}H_6Cl_4$	1, 2, 3, 4-Tetrachloroanthracene	315.88	149			
4606	$C_{14}H_6Cl_4$	α-Tetrachloroanthracene	315.88	220			
4607	$C_{14}H_6Cl_4$	β-Tetrachloroanthracene	315.88	152			
4608	$C_{14}H_6N_2O_6$	1, 3-Dinitroanthraquinone	298.06	240			
4609	$C_{14}H_6O_8$	Ellagic acid	302.05			1.667^{18}	
4610	$C_{14}H_7ClO_2$	1-Chloroanthraquinone	242.51	162			
4611	$C_{14}H_7ClO_2$	2-Chloroanthraquinone	242.51	208			
4612	$C_{14}H_7ClO_2$	3-Chloroanthraquinone	242.51	204			
4613	$C_{14}H_7NO_4$	1-Nitroanthraquinone	253.06	230			
4614	$C_{14}H_7NO_4$	2-Nitroanthraquinone	253.06	181			
4615	$C_{14}H_7NO_6$	4-Nitro-α-alizarin	285.06	289			
4616	$C_{14}H_7NO_6$	3-Nitro-β-alizarin	285.06	244			
4617	$C_{14}H_8Br_2$	9, 10-Dibromoanthracene	335.89	221			
4618	$C_{14}H_8Cl_2$	1, 2-Dichloroanthracene.	246.98	255			
4619	$C_{14}H_8Cl_2$	9, 10-Dichloroanthracene	246.98	209			
4620	$C_{14}H_8O_2$	Anthraquinone $C_6H_4:(CO)_2.C_6H_4$	208.06	285	379.8	1.438	
4621	$C_{14}H_8O_2$	Isoanthraquinone	208.06	212			
4622	$C_{14}H_8O_2$	Phenanthraquinone	208.06	207	360	1.405	
4623	$C_{14}H_8O_2$	3, 4-Phenanthraquinone	208.06	133			
4624	$C_{14}H_8O_3$	2-Hydroxyanthraquinone	224.06	302			
4625	$C_{14}H_8O_3$	Diphenic anhydride	224.06	219			
4626	$C_{14}H_8O_4$	Alizarin	240.06	290	430		
4627	$C_{14}H_8O_4$	Anthraflavic acid	240.06	330			
4628	$C_{14}H_8O_4$	Anthrarufin	240.06	280			
4629	$C_{14}H_8O_4$	1, 6-Dihydroxyanthraquinone	240.06	272			
4630	$C_{14}H_8O_4$	1, 7-Dihydroxyanthraquinone	240.06	292			
4631	$C_{14}H_8O_4$	Chrysazin	240.06	191			
4632	$C_{14}H_8O_4$	Hystazarin (2, 3-Dihydroxyanthraquinone)	240.06	>280			
4633	$C_{14}H_8O_4$	Quinizarin.	240.06	195			
4634	$C_{14}H_8O_4$	Xanthopurpurin	240.06	263			
4635	$C_{14}H_8O_5$	Anthragallol	256.06	310	s. 290		
4636	$C_{14}H_8O_5$	Anthrapurpurin	256.06	330	462		
4637	$C_{14}H_8O_5$	Flavopurpurin	256.06	>360	459		
4638	$C_{14}H_8O_5$	Purpurin	256.06	256			
4639	$C_{14}H_8O_5$	1, 4, 6-Trihydroxyanthraquinone	256.06	>300			
4640	$C_{14}H_9Cl$	1-Chloroanthracene	212.53	82		$1.171^{99.5}$	1140
4641	$C_{14}H_9Cl$	9-Chloroanthracene	212.53	103			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4642	$C_{14}H_9NO_2$	1-Aminoanthraquinone	223.08	256			
4643	$C_{14}H_9NO_2$	2-Aminoanthraquinone	223.08	302			
4644	$C_{14}H_9NO_2$	9-Nitroanthracene	223.08	146			
4645	$C_{14}H_9NO_2$	2-Nitrophenanthrene	223.08	99			
4646	$C_{14}H_9NO_2$	3-Nitrophenanthrene	223.08	170			
4647	$C_{14}H_9NO_2$	4-Nitrophenanthrene	223.08	80			
4648	$C_{14}H_9NO_2$	9-Nitrophenanthrene	223.08	116			
4649	$C_{14}H_{10}$	Anthracene $C_6H_4:(CH)_2:C_6H_4$	178.08	218	342	1.25_4^{27}	
4650	$C_{14}H_{10}$	Diphenylacetylene $C_6H_5C⋮CC_6H_5$	178.08	60	300		
4651	$C_{14}H_{10}$	Isoanthracene	178.08	134.5			
4652	$C_{14}H_{10}$	Phenanthrene	178.08	99.6	340.2	1.025	1158
4653	$C_{14}H_{10}Cl_2$	Dichlorostilbene	248.99	170			
4654	$C_{14}H_{10}Cl_2$	α-Tolane dichloride	248.99	143	183^{15}		
4655	$C_{14}H_{10}Cl_2$	β-Tolane dichloride	248.99	63	178^{18}		
4656	$C_{14}H_{10}Cl_4$	Tolane tetrachloride	319.91	163			
4656.1	$C_{14}H_{10}N_2O_2$	Phthalylphenylhydrazine	238.09	179		1.356	
4657	$C_{14}H_{10}N_2O_2$	α-Diaminoanthraquinone	238.09	236			
4658	$C_{14}H_{10}N_2O_2$	β-Diaminoanthraquinone	238.09	>300			
4659	$C_{14}H_{10}N_2O_3$	*p, p'*-Azoxybenzaldehyde	254.09	194			
4660	$C_{14}H_{10}N_2O_4$	*o, o'*-Azobenzoic acid	270.09	237			
4661	$C_{14}H_{10}N_2O_4$	*m, m'*-Azobenzoic acid	270.09	340			
4662	$C_{14}H_{10}N_2O_4$	α-*p, p'*-Dinitrostilbene	270.09	285			
4663	$C_{14}H_{10}N_2O_4$	β-*p, p'*-Dinitrostilbene	270.09	216			
4664	$C_{14}H_{10}N_2O_5$	*o, o'*-Azoxybenzoic acid	286.09	240			
4665	$C_{14}H_{10}N_2O_5$	*m, m'*-Azoxybenzoic acid	286.09	320			
4666	$C_{14}H_{10}N_2O_5$	*p, p'*-Azoxybenzoic acid	286.09	240 d.			
4667	$C_{14}H_{10}O$	Anthranol	194.08	170 d.			
4668	$C_{14}H_{10}O$	1-Anthrol (1-Hydroxyanthracene)	194.08	153			
4669	$C_{14}H_{10}O$	2-Anthrol	191.08	200 d.			
4670	$C_{14}H_{10}O$	Diphenylketene $(C_6H_5)_2C:CO$	194.08		146^{12}	1.104	
4671	$C_{14}H_{10}O$	Phenanthrone	191.08	152			
4672	$C_{14}H_{10}O_2$	Benzil $C_6H_5COCOC_6H_5$	210.08	95.2	348	$1.521_4^{12.3}$	1186
4673	$C_{14}H_{10}O_2$	Chrysazol	210.08	220 d.			
4674	$C_{14}H_{10}O_2$	Flavene	210.08	270			
4675	$C_{14}H_{10}O_2$	3, 4-Dihydroxyphenanthrene	210.08	143			
4676	$C_{14}H_{10}O_3$	Benzoic anhydride $(C_6H_5CO)_2O$	226.08	43	360	1.199_4^{15}	
4677	$C_{14}H_{10}O_3$	*o*-Benzoylbenzoic acid	226.08	127			
4678	$C_{14}H_{10}O_3$	*m*-Benzoylbenzoic acid	226.08	162			
4679	$C_{14}H_{10}O_3$	*p*-Benzoylbenzoic acid	226.08	194			
4680	$C_{14}H_{10}O_3$	Desoxyalizarin	226.08	208			
4681	$C_{14}H_{10}O_3$	Disalicylic aldehyde	226.08	128			
4682	$C_{14}H_{10}O_4$	Benzoylsalicylic acid	212.08	207			
4683	$C_{14}H_{10}O_4$	1, 8-Diphenic acid	242.08	252			
4684	$C_{14}H_{10}O_4$	1, 9-Diphenic acid	212.08	216			
4685	$C_{14}H_{10}O_4$	1, 10-Diphenic acid	242.08	228			
4686	$C_{14}H_{10}O_4$	2, 9-Diphenic acid	242.08	340			
4687	$C_{14}H_{10}O_4$	Diphenyl oxalate $(CO_2C_6H_5)_2$	242.08	136 d.	325 s. d.		
4688	$C_{14}H_{10}O_4$	Benzoyl peroxide $(C_6H_5CO_2)_2$	242.08	104	d.		1235
4689	$C_{14}H_{10}O_4S_2$	Dithiosalicylic acid	306.21	290			
4690	$C_{14}H_{10}O_5$	Gentianin	258.08	267	400		
4691	$C_{14}H_{10}O_5$	Gentienin	258.08	225			
4692	$C_{14}H_{10}O_5$	Salicylosalicylic acid	258.08	148			
4693	$C_{14}H_{10}O_6$	Aponic acid	274.08	252 d.			
4694	$C_{14}H_{10}O_9$	Tannin	322.08	200 d.			
4695	$C_{14}H_{11}N$	α-Anthramine $C_6H_4:(CH)_2:C_6H_3NH_2$	193.09	130			
4696	$C_{14}H_{11}N$	β-Anthramine $C_6H_4.(CH)_2.C_6H_3NH_2$.	193.09	238			
4697	$C_{14}H_{11}N$	*o*-Benzylbenzonitrile	193.09	19	314		
4698	$C_{14}H_{11}N$	1-Methylacridine	193.09	88			
4699	$C_{14}H_{11}N$	3-Methylacridine	193.09	134			
4700	$C_{14}H_{11}N$	5-Methylacridine	193.09	114	360^{740}		
4701	$C_{14}H_{11}N$	α-Naphthoquinaldine	193.09		>300		
4702	$C_{14}H_{11}N$	β-Naphthoquinaldine	193.09	82	>300		
4703	$C_{14}H_{11}N$	γ-Naphthoquinaldine	193.09	92			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
4704	$C_{14}H_{11}NO_2$	*α*-Benziloxime $C_6H_5COC(:NOH)C_6H_5$	225.09	138			
4705	$C_{14}H_{11}NO_3$	Dibenzohydroxamic acid	241.09	161			
4706	$C_{14}H_{11}NO_4$	Disalicylamide	257.09	200 d.			
4707	$C_{14}H_{12}$	1, 1-Diphenylethylene $(C_6H_5)_2C:CH_2$	180.09	9	277	1.038_4^{14}	837
4708	$C_{14}H_{12}$	Stilbene $C_6H_5CH:CHC_6H_5$	180.09	124	307	$0.970_{13}^{12.5}$	
4709	$C_{14}H_{12}N_2$	Benzalazine $C_6H_5CH:N.NCH C_6H_5$	208.11	93			
4710	$C_{14}H_{12}N_2$	Orexine.	208.11	95		1.290^4	
4711	$C_{14}H_{12}N_2$	Tolazone . .	208.11	187	>360		
4712	$C_{14}H_{12}N_2O_2$	*α*-Benzildioxime $(C_6H_5C:NOH)_2$	240.11		237 d.		
4713	$C_{14}H_{12}N_2O_2$	*β*-Benzildioxime. .	240.11	105			
4714	$C_{14}H_{12}N_2O_2$	*γ*-Benzildioxime	240.11	165			
4715	$C_{14}H_{12}N_2O_2$	Oxanilide $(CONHC_6H_5)_2$	240.11	250	320		
4716	$C_{14}H_{12}N_2O_4$	Di-*o*-aminophenyl oxalate	272.11	167.5 d.			
4717	$C_{14}H_{12}N_2O_4$	Di-*m*-aminophenyl oxalate	272.11	180 d.			
4718	$C_{14}H_{12}N_2O_4$	Di-*p*-aminophenyl oxalate	272.11	220 d.			
4719	$C_{14}H_{12}N_2O_4$	Hydrazo-*o*-benzoic acid	272.11	205			
4722	$C_{14}H_{12}N_2S$	Dehydrothio-*p*-toluidine	240.17	191	434		
4723	$C_{14}H_{12}O$	Diphenylacetaldehyde	196.09		193^{27}	1.100	775
4724	$C_{14}H_{12}O$	Phenyl benzyl ketone	196.09	60	322		
4725	$C_{14}H_{12}O$	Phenyl *o*-tolyl ketone	196.09	> −18	316		
4726	$C_{14}H_{12}O$	Phenyl *m*-tolyl ketone	196.09		316.5	$1.088^{17.5}$	
4727	$C_{14}H_{12}O$	Phenyl *p*-tolyl ketone	196.09	60	326.5		1188
4728	$C_{14}H_{12}O_2$	Benzoin $C_6H_5COCH(OH)C_6H_5$	212.09	133	344		
4729	$C_{14}H_{12}O_2$	*o*-Benzylbenzoic acid. . . .	212.09	114			
4730	$C_{14}H_{12}O_2$	*m*-Benzylbenzoic acid	212.09	108			
4731	$C_{14}H_{12}O_2$	*p*-Benzylbenzoic acid	212.09	155			
4732	$C_{14}H_{12}O_2$	Diphenylacetic acid $(C_6H_5)_2CHCO_2H$	212.09	148			
4733	$C_{14}H_{12}O_2$	Benzyl benzoate $C_6H_5CO_2CH_2C_6H_5$	212.09	18.5	324	$1.114^{18.5}$	
4734	$C_{14}H_{12}O_2$	*p*-Cresyl benzoate *p*-$CH_3C_6H_5O_2CC_6H_5$	212.09	71.5	316		
4735	$C_{14}H_{12}O_3$	Benzyl salicylate	228.09		$214^{22.5}$		
4736	$C_{14}H_{12}O_2$	*m*-Cresyl benzoate $C_6H_5CO_2C_6H_4CH_3$	212.09	55			
4737	$C_{14}H_{12}O_3$	Trihydroxydihydroanthracene	228.09	256			
4738	$C_{14}H_{12}O_3$	Benzilic acid $(C_6H_5)_2C(OH)CO_2H$	228.09	150			
4739	$C_{14}H_{12}O_3$	Amyrolin	228.09	124		1.351^{18}	1312
4740	$C_{14}H_{12}O_3$	Benzosol $C_6H_5CO_2C_6H_4(OCH_3)$-*o*	228.09	61			
4741	$C_{14}H_{12}O_3$	*o*-Cresyl salicylate	228.09	35			
4742	$C_{14}H_{12}O_3$	*m*-Cresyl salicylate	228.09	74			
4743	$C_{14}H_{12}O_3$	*p*-Cresyl salicylate	227.09	39			
4744	$C_{14}H_{12}O_4$	Cotoin. . .	224.09	129			
4745	$C_{14}H_{12}O_4$	Isocotoin . .	244.09	162			
4746	$C_{14}H_{12}O_4$	Guaiacyl salicylate	244.09	65			
4747	$C_{14}H_{12}O_6$	Gardenin .	276.09	164			
4748	$C_{14}H_{13}NO$	*N*-Benzoyl-*o*-toluidine	211.11	143			1296
4749	$C_{14}H_{13}NO$	*N*-Benzoyl-*m*-toluidine	211.11	125			1209
4750	$C_{14}H_{13}NO$	*N*-Benzoyl-*p*-toluidine	211.11	158	232		1291
4751	$C_{14}H_{13}NO$	*o*-Benzylbenzamide	211.11	163			
4752	$C_{14}H_{13}NO$	*N*-Diphenylacetamide	211.11	103			1281
4753	$C_{14}H_{13}NO$	Phenylacetanilide.	211.11	117			
4754	$C_{14}H_{13}NO_2$	Benzoylanisidine	227.11	154			
4755	$C_{14}H_{13}N_3O$	*m*-Acetylaminoazobenzene	239.12	131			
4756	$C_{14}H_{14}$	Dibenzyl $(C_6H_5CH_2)_2$	182.11	52.5	284	$0.942_4^{20.6}$	1118
4757	$C_{14}H_{14}$	1, 1-Diphenylethane $(C_6H_5)_2CHCH_3$	182.11		272	1.006_0^{21}	763
4758	$C_{14}H_{14}$	*o, o′*-Ditolyl $(CH_3C_6H_4)_2$. .	182.11	17.8	272	0.955^{10}	
4759	$C_{14}H_{14}$	*o, m′*-Ditolyl $(CH_3C_6H_4)_2$. .	182.11		287.5		
4760	$C_{14}H_{14}$	*o, p′*-Ditolyl $(CH_3C_6H_4)_2$. .	182.11		281		
4761	$C_{14}H_{14}$	*m, m′*-Ditolyl $(CH_3C_6H_4)_2$	182.11	7	288	0.999	
4762	$C_{14}H_{14}$	*p, p′*-Ditolyl $(CH_3C_6H_4)_2$	182.11	121	295		
4763	$C_{14}H_{14}N_2$	*o, o′*-Azotoluene (*o*-$CH_3C_6H_4N)_2$	210.12	55			
4764	$C_{14}H_{14}N_2$	*o′, p′*-Azotoluene . . .	210.12	71			
4765	$C_{14}H_{14}N_2$	*m, m′*-Azotoluene (*m*-$CH_3C_6H_4)_2N_2$.	210.12	55			
4766	$C_{14}H_{14}N_2$	*p, p′*-Azotoluene (*p*-$CH_3C_6H_4)_2N_2$	210.12	144			
4767	$C_{14}H_{14}N_2$	*o, o′*-Diaminostilbene.	210.12	170			
4768	$C_{14}H_{14}N_2$	*p, p′*-Diaminostilbene.	210.12	231			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No.
4769	$C_{14}H_{14}N_2O$	Agathin *o*-$OHC_6H_4CH:N.N(CH_3)C_6H_5$.	226.12	74			
4770	$C_{14}H_{14}N_2O$	*o, o'*-Azoxytoluene	226.12	59			
4771	$C_{14}H_{14}N_2O$	*m, m'*-Azoxytoluene	226.12	37			
4772	$C_{14}H_{14}N_2O$	*p, p'*-Azoxytoluene	226.12	70			
4773	$C_{14}H_{14}N_2O_2$	*o, o'*-Azoanisol (*o*-$CH_3OC_6H_4)_2N_2$.	*242.12*	*164.0*			
4774	$C_{14}H_{14}N_2O_3$	*p, p'*-Azoxyanisol (*p*-$CH_3OC_6H_4)_2N_2$.	*258.12*	*117.4*			
4775	$C_{14}H_{14}N_4$	"Cyanaline"	*238.14*	*220*			
4776	$C_{14}H_{14}N_4O_5$	Theobromine salicylate	*318.14*				1333
4777	$C_{14}H_{14}O$	Benzyl ether $((C_6H_5CH_2)_2O)$	*198.11*		298	1.036^{16}	
4778	$C_{14}H_{14}O$	*o*-Cresyl ether $((CH_3C_6H_4)_2O)$	198.11		278	$1.047^{24.3}$	
4779	$C_{14}H_{14}O$	*m*-Cresyl ether $((CH_3C_6H_4)_2O)$	198.11		288		
4780	$C_{14}H_{14}O$	*p*-Cresyl ether (*p*-$CH_3C_6H_4)_2O)$	198.11	50			
4781	$C_{14}H_{14}O_2$	*dl*-Hydrobenzoin $[C_6H_5CH(OH)]_2$	214.11	139	>300		
4782	$C_{14}H_{14}O_2$	Guaiacyl benzyl ether	214.11	62			
4783	$C_{14}H_{14}O_2$	Isohydrobenzoin	214.11	121			
4784	$C_{14}H_{14}O_2S$	Dibenzylsulfone $((C_6H_5CH_2)_2SO_2$	246.17	150	290 s. d.		
4785	$C_{14}H_{14}O_2S$	*p*-Ditolylsulfone $((CH_3C_6H_4)_2SO_2$	246.17	158	405^{714}		
4786	$C_{14}H_{14}S_2$	Dibenzyl disulfide $((C_6H_5CH_2)_2S_2$	246.24	72			
4787	$C_{14}H_{14}S$	Dibenzylsulfide $((C_6H_5CH_2)_2S$	214.17	49		1.071^{50}_{50}	
4788	$C_{14}H_{14}Se$	Dibenzyl selenide $((C_6H_5CH_2)_2Se$	261.31	45.5			
4789	$C_{14}H_{15}N$	Dibenzylamine $((C_6H_5CH_2)_2NH$	197.12	−26.0	300	$1.026^{21.6}_{4}$	976
4790	$C_{14}H_{15}N$	*o*-Ditolylamine (*o*-$CH_3C_6H_4)_2NH$.	197.12		313.4		
4791	$C_{14}H_{15}N$	*m*-Ditolylamine (*m*-$CH_3C_6H_4)_2NH$	197.12		320		
4792	$C_{14}H_{15}N$	*p*-Ditolylamine (*p*-$CH_3C_6H_4)_2NH$	197.12	79	330.5		
4793	$C_{14}H_{15}N$	Ethyldiphenylamine $((C_6H_5)_2NC_2H_5$	197.12		297		
4794	$C_{14}H_{15}N$	*N*-Methylbenzylaniline	197.12	9.2	306		
4795	$C_{14}H_{15}NO_2S$	*p*-Toluenesulfonemethylanilide	261.19	95			
4796	$C_{14}H_{15}N_3$	4-Amino-2, 4'-dimethylazobenzene	225.14	127			
4797	$C_{14}H_{15}N_3$	4'-Amino-2, 3'-dimethylazobenzene	225.14	100			
4798	$C_{14}H_{15}N_3$	4-Amino-2, 3'-dimethylazobenzene	225.14	80			
4799	$C_{14}H_{15}N_3$	4-Amino-3, 4'-dimethylazobenzene	225.14	127			
4800	$C_{14}H_{15}N_3$	*o, o'*-Diazoaminotoluene	225.14	51			
4801	$C_{14}H_{15}N_3$	*p, p'*-Diazoaminotoluene	225.14	116			
4802	$C_{14}H_{16}$	Hexahydroanthracene	184.12	63	290		
4803	$C_{14}H_{16}N_2$	*o*-Hydrazotoluene (*o*-$CH_3C_6H_4NH)_2$	212.14	165			
4805	$C_{14}H_{16}N_2$	*p*-Hydrazotoluene $((CH_3C_6H_4NH)_2$	212.14	126	d.	0.957	
4806	$C_{14}H_{16}N_2$	*o*-Tolidine $[4, 3\text{-}H_2N(CH_3)C_6H_3]_2$	212.14	129			
4807	$C_{14}H_{16}N_2$	*m*-Tolidine $[4, 2\text{-}H_2N(CH_3)C_6H_3]_2$	212.14	107			
4808	$C_{14}H_{16}N_2O$	3-Ethoxybenzidine	228.14	139			
4809	$C_{14}H_{16}N_2O_2$	3, 3'-Dimethoxybenzidine	244.14	172			
4810	$C_{14}H_{16}N_4$	2, 2'-Diamino-4, 4'-azotoluene	240.16	203			
4811	$C_{14}H_{16}N_4$	3, 3'-Diamino-2, 2'-azotoluene	240.16	a, 145; b, 133; c, 159			
4812	$C_{14}H_{16}N_4O_9$	Oscine picrate	384.16	238			
4813	$C_{14}H_{17}N$	Diethyl-α-naphthylamine	199.14		160.6^{18}	1.005	937
4814	$C_{14}H_{17}N$	Diethyl-β-naphthylamine	199.14		192^{19}	1.026	977
4815	$C_{14}H_{17}NO$	Etheserolene.	215.14	48			
4816	$C_{14}H_{17}NO_6$	Indican	295.14	57			
4817	$C_{14}H_{17}NO_6$	*l*-Mandelonitrile glucoside	295.14	147			
4818	$C_{14}H_{17}NO_6$	Prulaurasin	295.14	122			
4819	$C_{14}H_{17}NO_6$	Sambunigrin	295.14	152			
4820	$C_{14}H_{18}O_3$	Apocynamarin	234.14	175 d.			
4821	$C_{14}H_{18}O_7$	Picein	298.14	194			
4822	$C_{14}H_{20}N_2O_6S$	Methylamino-*p*-phenol sulfate	344.24	260 d.			
4823	$C_{14}H_{20}O_2$	Isanic acid	220.15	41			
4823.1	$C_{14}H_{20}O_2$	*l*-Amyl hydrocinnamate	220.15		172^{28}	0.9721	
4824	$C_{14}H_{20}O_3$	Helleboretin	236.15	>200			
4825	$C_{14}H_{21}ClN_2O_4$	Nirvanin	316.64	185			
4826	$C_{14}H_{21}NO_2$	Thymacetine	235.17	136			
4827	$C_{14}H_{22}$	1, 2, 3, 4-Tetraethylbenzene	190.17		254	0.887	637
4828	$C_{14}H_{22}$	1, 2, 4, 5-Tetraethylbenzene	190.17	13	250	0.888	609
4829	$C_{14}H_{22}ClNO_2$	Stovain.	271.64	175			
4830	$C_{14}H_{22}O_2$	Longifolic acid	222.17	153	234^{55}		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4831	$C_{14}H_{22}O_4$	Dicyclohexyl oxalate	254.17	45	191^{13}		
4831.1	$C_{14}H_{23}ClO_4$	Di-*l*-amyl chlorofumarate	290.65		185^{13}	1.052^{25}	
4832	$C_{14}H_{23}N$	*N*-Dibutylaniline $C_6H_5N(C_4H_9)_2$	205.19		262.8		
4832.1	$C_{14}H_{23}N$	Diisobutylaniline	205.19		146^{21}	0.909^{16}	
4833	$C_{14}H_{24}O_2$	Kersyl alcohol.	224.19	85	156^{11}		
4834	$C_{14}H_{24}O_2$	*d*-Bornyl *n*-butyrate.	224.19		121^{11}	0.966^{15}	856
4835	$C_{14}H_{24}O_2$	Geranyl butyrate .	224.19		153^{18}	0.901	
4836	$C_{14}H_{24}O_2$	*l*-Menthyl crotonate	224.19		140.5^{14}	0.833	
4837	$C_{14}H_{24}O_3$	*l*-Menthyl acetoacetate	240.19	45	145^{11}	0.986^{15}_{15}	
4837.1	$C_{14}H_{24}O_4$	Di-*l*-amyl maleate	256.19		165^{25}	0.9708^{25}	
4838	$C_{14}H_{24}O_4$	*l*-Menthyl acid succinate	256.19	62	300 d.		
4839	$C_{14}H_{25}NO_2$	Carpaine..	239.20	121			1333
4840	$C_{14}H_{26}ClNO_2$	Carpaine hydrochloride	275.67	225			
4841	$C_{14}H_{26}O_2$	*l*-Menthyl *n*-butyrate	226.20		129^{15}	0.911	
4842	$C_{14}H_{26}O_2$	*l*-Menthyl isobutyrate	226.20		117^{12}	0.906	
4843	$C_{14}H_{26}O_3$	*n*-Heptylic anhydride $(C_6H_{13}CO)_2O$	242.20	17	258	0.932	332
4844	$C_{14}H_{26}O_3$	Menthyl ethyl glycollate	242.20		155^{20}		
4845	$C_{14}H_{26}O_4$	Diamyl succinate	258.20		293	0.952^{25}_{25}	
4845.1	$C_{14}H_{26}O_4$	Di-*l*-amyl succinate	258.20		129^{1}	0.957^{25}	
4846	$C_{14}H_{26}O_4$	Diethyl sebacate..	258.20	1	308	0.965^{16}	
4846.1	$C_{14}H_{26}O_6$	Diisoamyl tartrate .	290.20		195^{16}	1.063^{15}	
4847	$C_{14}H_{27}ClO$	Myristyl chloride $CH_3(CH_2)_{12}COCl$.	246.67	−1	168^{15}		
4848	$C_{14}H_{27}N$	Myristic nitrile $CH_3(CH_2)_{12}CN$	209.22	19	226^{100}	0.828	
4849	$C_{14}H_{28}$	*n*-Tetradecylene	196.22	−12	246	0.775	
4850	$C_{14}H_{28}O$	Myristic aldehyde $CH_3(CH_2)_{12}CHO$	212.22	52.5	166^{24}		
4851	$C_{14}H_{28}O_2$	Myristic acid $CH_3(CH_2)_{12}CO_2H$	228.22	58	250.5^{100}	0.858^{60}_{4}	1088
4852	$C_{14}H_{28}O_2$	Ethyl laurate $C_{11}H_{23}CO_2C_2H_5$	228.22	−10.7	269	0.868^{19}_{4}	337
4853	$C_{14}H_{28}O_3$	Hydroxymyristic acid........	244.22	51			
4854	$C_{14}H_{28}O_4$	Ipurolic acid	260.22	101			
4855	$C_{14}H_{29}NO$	Myristic amide $CH_3(CH_2)_{12}CONH_2$	227.23	103			
4856	$C_{14}H_{30}$	*n*-Tetradecane $CH_3(CH_2)_{12}CH_3$	198.23	5.5	252.5	0.765	412
4857	$C_{14}H_{30}O$	*n*-Heptyl ether $(C_7H_{15})_2O$...	214.23		260	0.815^{0}	
4858	$C_{14}H_{30}O$	*n*-Tetradecyl alcohol $C_{13}H_{27}CH_2OH$	214.23	38	167^{15}	0.824^{38}_{4}	
4859	$C_{14}H_{31}N$	Tetradecyl amine $C_{13}H_{27}CH_2NH_2$	213.25	37	162^{15}		
4860	$C_{15}H_8O_4$	Anthraquinone-α-carboxylic acid	252.06	294			
4861	$C_{15}H_8O_4$	Anthraquinone-β-carboxylic acid	252.06	288			
4862	$C_{15}H_8O_4$	Anthraquinone-γ-carboxylic acid	252.06	285			
4863	$C_{15}H_8O_6$	Alizarin-β-carboxylic acid	284.06	305			
4864	$C_{15}H_8O_7$	Pseudopurpurin.	300.06	220			
4865	$C_{15}H_9N$	Thebenidine.....	203.08	148			
4866	$C_{15}H_{10}$	Fluoranthene. .	190.08	110	251^{60}		
4867	$C_{15}H_{10}$	Succisterene	190.08	160	300		
4868	$C_{15}H_{10}O_2$	Flavone .	222.08	97			
4869	$C_{15}H_{10}O_2$	Anthracene-1-carboxylic acid	222.08	260			
4870	$C_{15}H_{10}O_2$	Anthracene-2-carboxylic acid	222.08	280			
4871	$C_{15}H_{10}O_2$	Anthracene-9-carboxylic acid	222.08	206			
4872	$C_{15}H_{10}O_2$	1-Methylanthraquinone	222.08	171			
4873	$C_{15}H_{10}O_2$	2-Methylanthraquinone	222.08	175			
4874	$C_{15}H_{10}O_4$	Chrysine.....	254.08	275			
4875	$C_{15}H_{10}O_4$	Chrysophanic acid	254.08	193			
4876	$C_{15}H_{10}O_4$	α-Methylalizarin	254.08	229			
4877	$C_{15}H_{10}O_4$	β-Methylalizarin	254.08	179			
4878	$C_{15}H_{10}O_4$	Rumicin	254.08	182			
4879	$C_{15}H_{10}O_5$	Aloe-emodin. .	270.08	218			
4880	$C_{15}H_{10}O_5$	Emodin..	270.08	250			
4881	$C_{15}H_{10}O_5$	Galangin. .	270.08	217			
4882	$C_{15}H_{10}O_5$	Morindon .	270.08	275			
4883	$C_{15}H_{10}O_6$	Fisetin.	286.08	360			
4884	$C_{15}H_{10}O_6$	Kaempferol ..	286.08	274			
4885	$C_{15}H_{10}O_6$	Luteolin.	286.08	320			
4886	$C_{15}H_{10}O_6$	Rhein	286.08	314			
4887	$C_{15}H_{10}O_6$	Scutellarein..	286.08	300 d.			
4888	$C_{15}H_{10}O_7$	Morin.................	302.08	285			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	*d*	R. I. No
4889	$C_{15}H_{10}O_7$	Quercetin	302.08	310			
4890	$C_{15}H_{10}O_8$	Gossypetin	318.08	230			
4891	$C_{15}H_{10}O_8$	Quercetagetin	318.08	318			
4892	$C_{15}H_{11}N$	2-Phenylquinoline	205.09	86	363		
4893	$C_{15}H_{11}N$	4-Phenylquinoline	205.09	62			
4894	$C_{15}H_{11}N$	6-Phenylquinoline	205.09	111	260^{77}	1.195	
4895	$C_{15}H_{11}N$	8-Phenylquinoline	205.09		283^{187}		
4896	$C_{15}H_{11}NO$	Benzoylphenylacetonitrile	221.09	99			
4897	$C_{15}H_{12}$	α-Methylanthracene	192.09	86	200	$1.047^{99.4}$	1134
4898	$C_{15}H_{12}$	2-Methylanthracene	192.09	207			
4899	$C_{15}H_{12}$	9-Methylanthracene	192.09	80		$1.066^{99.4}$	1136
4900	$C_{15}H_{12}N_2O_3$	Furfuramide	268.11	121	250 d.		
4901	$C_{15}H_{12}N_2O_3$	Furfurine	268.11	116			
4902	$C_{15}H_{12}O$	Benzylideneacetophenone	208.09	62	348	1.071_4^{62}	
4903	$C_{15}H_{12}O_2$	Benzoylacetophenone	224.09	81	>200		
4904	$C_{15}H_{12}O_3$	*p*-Toluyl-*o*-benzoic acid	240.09	139			
4905	$C_{15}H_{12}O_4$	Chrysophanol	240.09	204			
4906	$C_{15}H_{12}O_4$	Acetylsalol *o*-$CH_3CO_2C_6H_4CO_2C_6H_5$	256.09	97	198		
4907	$C_{15}H_{12}O_4$	Benzosalin	256.09	85	385		
4908	$C_{15}H_{12}O_4$	Diphenyl malonate $CH_2(CO_2C_6H_5)_2$	256.09	50	210^{15} d.		
4909	$C_{15}H_{12}O_6$	Eriodictyol	288.09	267			
4910	$C_{15}H_{12}O_6$	Methylenedisalicylic acid	288.09	238 d.			
4911	$C_{15}H_{13}NO_4$	Salophen	271.11	188			
4912	$C_{15}H_{14}O$	Benzylacetophenone	210.11	73	360		
4913	$C_{15}H_{14}O$	Benzyl *p*-tolyl ketone	210.11	109	360		
4914	$C_{15}H_{14}O$	Dibenzyl ketone $(C_6H_5CH_2)_2CO$	210.11	33.9	330.5		
4915	$C_{15}H_{14}O$	*p*, *p'*-Dimethylbenzophenone	210.11	92	335.1		
4916	$C_{15}H_{14}O_2$	Benzyl *o*-toluate	226.11		315	1.12^{17}	
4917	$C_{15}H_{14}O_2$	Benzyl phenylacetate	226.11		319	1.101	
4918	$C_{15}H_{14}O_3$	Benzyl mandelate	242.11	93			
4919	$C_{15}H_{14}O_3$	Methyl benzilate	242.11	73			
4920	$C_{15}H_{14}O_3$	Lapachol	242.11	140			
4921	$C_{15}H_{14}O_4$	Hydrocotoin	258.11	95.5			
4922	$C_{15}H_{14}O_4$	Peucedanin	258.11	109			
4923	$C_{15}H_{14}O_4$	*N*-Xanthoxylin	258.11	132.5			
4924	$C_{15}H_{14}O_5$	Guaiacyl carbonate $(o\text{-}CH_3OC_6H_4O)_2CO$.	274.11	86			
4925	$C_{15}H_{14}O_5$	Kavain (Methysticin)	274.11	137			
4926	$C_{15}H_{14}O_5$	Phloretin	274.11	255 d.			1333
4927	$C_{15}H_{15}NO$	*p*-Dimethylaminobenzophenone	225.12	90			
4928	$C_{15}H_{15}NO_3$	Malakin	257.12	92			
4929	$C_{15}H_{15}NO_8$	Narceinic acid	337.12	184			
4930	$C_{15}H_{16}$	Dibenzylmethane $(C_6H_5CH_2)_2CH_2$	196.12	< −20	299	1.007	762
4931	$C_{15}H_{16}N_2O$	*sym.*-Di-*o*-tolylurea	240.14	256			
4932	$C_{15}H_{16}N_2O$	*sym.*-Di-*m*-tolylurea	240.14	203			
4933	$C_{15}H_{16}N_2O$	*sym.*-Di-*p*-tolylurea	240.14	263			
4934	$C_{15}H_{16}N_2S$	1, 2-Di-*o*-tolylthiourea	256.20	156	218		
4935	$C_{15}H_{16}N_2S$	*sym.*-Di-*m*-tolylthiourea	256.20	111.5			
4936	$C_{15}H_{16}O_3$	Santinic acid	228.12	132.5			
4936.1	$C_{15}H_{16}O_6$	Picrotoxinin	292.12	206			1265
4937	$C_{15}H_{16}O_9$	Daphnin	340.12	200			
4938	$C_{15}H_{16}O_9$	Esculin	340.12	205			
4939	$C_{15}H_{17}N$	Ethylbenzylaniline	211.14		298	$1.034^{18.6}$	
4940	$C_{15}H_{17}N_3$	Di-*o*-tolylguanidine	239.16	179			
4941	$C_{15}H_{18}$	Azulene	198.14		168.4^{11}	0.988	
4942	$C_{15}H_{18}N_2$	*p*, *p'*-Diamino-*o*, *o'*-ditolylmethane	226.16	149			
4943	$C_{15}H_{18}O_3$	Santonin	246.14	170		1.187	1282
4944	$C_{15}H_{18}O_4$	Artemisin	262.14	202			1333
4944.1	$C_{15}H_{18}O_4$	Coriamyrtin	262.14	225			
4945	$C_{15}H_{18}O_7$	Hyenanchin	310.14	234 d.			
4946	$C_{15}H_{18}O_7$	Picrotin	310.14	250			
4947	$C_{15}H_{19}NO_2$	Tropacocaine	245.15	49	d.	1.043_4^{100}	1147
4948	$C_{15}H_{19}NO_9$	Lithuric acid	357.15	204.5			
4949	$C_{15}H_{20}ClNO_2$	Tropacocaine hydrochloride	281.62	271			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
4950	$C_{15}H_{20}O_2$	Alantolactone	232.15	76	192^{10}		
4951	$C_{15}H_{20}O_3$	Perezone	248.15	105			
4952	$C_{15}H_{20}O_3$	Pipitzol	248.15	141			
4953	$C_{15}H_{20}O_4$	Absinthiin	264.15	68			
4954	$C_{15}H_{20}O_4$	Isosantonic acid	264.15	155	160^4		
4955	$C_{15}H_{20}O_4$	*dl*-Santonic acid	264.15	120 d.			
4956	$C_{15}H_{20}O_4$	*d*(*l*)-Satonic acid	264.15	179	260^5	1.251	1333
4957	$C_{15}H_{20}O_8$	Androsin	328.15	220			
4958	$C_{15}H_{21}NO_2$	β-Eucaine	247.17	91			
4959	$C_{15}H_{21}NO_4$	Ajacine	279.17	143			
4960	$C_{15}H_{21}N_3O_2$	Physostigmine	275.19	105			1263
4961	$C_{15}H_{21}N_3O_3$	Geneserine	291.19	129			
4962	$C_{15}H_{22}BrN_3O_2$	Physostigmine hydrobromide	356.11				1333
4963	$C_{15}H_{22}ClNO_2$	β-Eucaine hydrochloride	283.64	268			
4964	$C_{15}H_{22}ClNO_4$	Ajacine hydrochloride	315.64	93			
4965	$C_{15}H_{22}ClN_3O_2$	Physostigmine hydrochloride	311.65				1333
4966	$C_{15}H_{22}O_2$	Santalic acid	234.17		195^9		
4967	$C_{15}H_{22}O_2$	Eugenol isoamyl ether	234.17		302.2 d.	0.976	846
4968	$C_{15}H_{22}O_2$	Thymyl isovalerate	234.17		249	0.959^{15}_{15}	
4969	$C_{15}H_{22}O_3$	Alantic (Alantolic) acid	250.17	94			
4970	$C_{15}H_{23}Cl$	Santalyl chloride	238.64		155^{10}	1.040	
4971	$C_{15}H_{24}$	Atractylene	204.19		$141^{14.0}$	0.927	625
4972	$C_{15}H_{24}$	*l*-Cadinene	204.19		275	0.918	631
4973	$C_{15}H_{24}$	Cannibene	204.19		259	0.897^{15}	
4974	$C_{15}H_{24}$	α-Caryophyllene	204.19		260	0.906	596
4975	$C_{15}H_{24}$	Cedrene	204.19		264	0.929	590
4976	$C_{15}H_{24}$	Clovene	204.19		263	0.930	603
4977	$C_{15}H_{24}$	Guajene	204.19		124^9	0.908	602
4978	$C_{15}H_{24}$	Patschoulene	204.19		256	0.930	591
4979	$C_{15}H_{24}$	α-Santalene	204.19		252	0.913^{15}	862
4980	$C_{15}H_{24}$	β-Santalene	204.19		126^7	0.894	569
4981	$C_{15}H_{24}$	γ-Santalene	204.19		120^{10}	0.936	617
4982	$C_{15}H_{24}$	α-Selinene	204.19		135^{16}	0.914	
4983	$C_{15}H_{24}$	Zingiberene	204.19		270	0.872^{15}	574
4984	$C_{15}H_{24}N_2O$	*d*(*l*)-Lupanine	248.20	44			
4985	$C_{15}H_{24}N_2O$	Oxysparteine	248.20	84	$209^{12.5}$		
4986	$C_{15}H_{24}O$	Betulol	220.19		158^{13}	0.978^{16}	865
4987	$C_{15}H_{24}O$	α-Santalol	220.19		300	0.979^{15}	957
4988	$C_{15}H_{24}O$	β-Santalol	220.19		309	0.973^{15}	958
4989	$C_{15}H_{25}BrO_2$	Bornyl bromoisovalerate	317.11		163^{10}		
4990	$C_{15}H_{25}NO_7$	Senecifolidine	331.20	212			
4991	$C_{15}H_{26}$	Elemone	206.20		119^{10}	0.883	
4992	$C_{15}H_{26}$	Ferulene	206.20		126^7	0.870	
4993	$C_{15}H_{26}N_2$	Isosparteine	234.22		$179^{16.5}$	1.028^{17}	916
4994	$C_{15}H_{26}N_2$	Sparteine	234.22		325.2	1.023	959
4995	$C_{15}H_{26}N_2O$	Retamine	250.22	162			
4996	$C_{15}H_{26}O$	Atractylol	222.20	59	292	1.511	
4997	$C_{15}H_{26}O$	Cedrol	222.20	87	294		
4998	$C_{15}H_{26}O$	α-Elemol	222.20	46	143^{10}	$0.941^{21.3}$	967
4999	$C_{15}H_{26}O$	β-Elemol	222.20		144^{10}	0.942^{18}	611
5000	$C_{15}H_{26}O$	Eudesmol	222.20	78	156^{10}	0.988	657
5001	$C_{15}H_{26}O$	Farnesol	222.20		$120^{0.2}$	0.895	548
5002	$C_{15}H_{26}O$	Guajol	222.20	93	289 s. d.		1175
5003	$C_{15}H_{26}O$	Nerolidol	222.20		277	0.880	891
5004	$C_{15}H_{26}O$	Zingiberol	222.20		$157^{14.5}$		
5005	$C_{15}H_{26}O_2$	Bornyl isovalerate	238.20		260	0.949	985
5006	$C_{15}H_{26}O_2$	Isobornyl isovalerate	238.20		138^{12}	0.957^{15}	
5007	$C_{15}H_{26}O_2$	*d*-Bornyl *n*-valerate	238.20		130^{11}	0.956^{15}	855
5008	$C_{15}H_{26}O_2$	*l*-Menthyl angelate	238.20		141^{16}		
5009	$C_{15}H_{26}O_3$	*l*-Menthyl levulinate	254.20		169^{12}	0.977	
5010	$C_{15}H_{26}O_6$	Tributyrin	302.20	< -75	310	1.027	351
5011	$C_{15}H_{27}ClN_2$	Sparteine hydrochloride	270.68				1333
5012	$C_{15}H_{27}IN_2$	Sparteine hydroiodide	362.16				1333

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5013	$C_{15}H_{28}O_2$	*l*-Menthyl isovalerate	240 22		127^{11}	0.907^{15}	427
5014	$C_{15}H_{28}O_2$	Cimicic acid	240 22	44 2			
5015	$C_{15}H_{28}O_2$	*l*-Menthyl *n*-valerate	240 22		141^{15}	0 907	
5016	$C_{15}H_{30}O_2$	Pentadecylic acid	242 23	54	257^{100}		
5017	$C_{15}H_{30}O_2$	Methyl myristate	242 23	19	295 3		
5018	$C_{15}H_{32}$	*n*-Pentadecane $CH_3(CH_2)_{13}CH_3$	212 25	10	270 5	0 772	
5019	$C_{15}H_{32}O$	*n*-Pentadecyl alcohol $CH_3(CH_2)_{14}OH$	228 25	46			
5020	$C_{15}H_{33}N$	Pentadecylamine	227 26	36 5	301		
5021	$C_{15}H_{33}N$	Triisoamylamine	227 26		237	$0\ 785^{25}_{25}$	
5022	$C_{16}H_8O_6$	Anthraquinone-1, 3-dicarboxylic acid	296 06	330			
5023	$C_{16}H_8O_6$	Anthraquinone-1, 4-dicarboxylic acid	296 06	300			
5024	$C_{16}H_8O_6$	Anthraquinone-2, 3-dicarboxylic acid	296 06	340			
5025	$C_{16}H_{10}$	Diphenyldiacetylene	202 08	88			
5026	$C_{16}H_{10}$	Pyrene .	202 08	150	>360		
5027	$C_{16}H_{10}N_2$	α; β-Naphthophenazine	230 09	142 5	>360		
5028	$C_{16}H_{10}N_2O_2$	Indigotin	262 09	392 d.		1 35	
5028 1	$C_{16}H_{10}O_3$	Diphenylmaleic anhydride	250 08	155		1 340	1211
5029	$C_{16}H_{10}O_4$	Anthracene-1, 3-dicarboxylic acid	266 08	330			
5030	$C_{16}H_{10}O_4$	Anthracene-1, 4-dicarboxylic acid	266 08	320			
5031	$C_{16}H_{10}O_4$	Anthracene-2, 3-dicarboxylic acid	266 08	345			
5032	$C_{16}H_{10}O_6$	Trifolitin	298 08	275			
5033	$C_{16}H_{11}N$	Amaron	217 09	240			
5034	$C_{16}H_{11}N$	Aminopyrene	217 09	116			
5035	$C_{16}H_{11}NO_2$	Atophan (2-Phenylquinoline-4-carboxylic acid	249.09	209			
5036	$C_{16}H_{11}N_3O_2$	Indigoxime	277 11	205			
5037	$C_{16}H_{12}$	α-Phenylnaphthalene	204 09		325		
5038	$C_{16}H_{12}$	β-Phenylnaphthalene	204 09	102.5	345		
5039	$C_{16}H_{12}$	Pseudophenanthrene	204 09	115			
5040	$C_{16}H_{12}ClNO_2$	Chloroxyl (Phenylcinchoninic acid hydrochloride)	285 56	223			
5041	$C_{16}H_{12}N_2O_4$	Isatid	296 11	237 5			
5042	$C_{16}H_{12}N_4O$	Azoxytolunitrile	276 12	182			
5043	$C_{16}H_{12}O$	Phenyl α-naphthyl ether	220 09	55	340		
5044	$C_{16}H_{12}O$	Phenyl β-naphthyl ether	220 09	45; 93	335 8		
5045	$C_{16}H_{12}O_3S$	Atronylenesulfonic acid	284 16	258			
5046	$C_{16}H_{12}O_4$	α-Ethylalizarin	268 09	189			
5047	$C_{16}H_{12}O_4$	Pratol.	268 09	253			
5048	$C_{16}H_{12}O_5$	Physcion (Physcic acid)	284 09	207			
5049	$C_{16}H_{12}O_6$	Chrysoeriol	300 09	>337			
5050	$C_{16}H_{12}O_6$	Emodine methyl ether .	300 09	195			
5051	$C_{16}H_{12}O_6$	Hematein	300 09	250 d.			
5052	$C_{16}H_{12}O_8$	Laccainic acid	332 09		180 d.		
5053	$C_{16}H_{13}N$	Flavoline	219 11	65	375		
5054	$C_{16}H_{13}N$	*N*-Phenyl-α-naphthylamine	219 11	62	335^{258}		
5055	$C_{16}H_{13}N$	*N*-Phenyl-β-naphthylamine . .	219 11	108	399 5		
5056	$C_{16}H_{13}NO_7$	Papaveric acid	331 11	233 d.			
5057	$C_{16}H_{13}N_3$	Galegine	233 12	65			
5058	$C_{16}H_{13}N_3$	Hydrazoindole	247 12	140			
5059	$C_{16}H_{14}$	Atronene	206 11		326		
5060	$C_{16}H_{14}$	2, 3-Dimethylanthracene	206 11	246			
5061	$C_{16}H_{14}$	2, 4-Dimethylanthracene	206.11	71			
5062	$C_{16}H_{14}$	2, 6-Dimethylanthracene	206 11	231			
5062 1	$C_{16}H_{14}$	Distyrene $C_6H_5CH{:}CHCH{:}CHC_6H_5$.	206 11	124			
5063	$C_{16}H_{14}$	9-Ethylanthracene .	206 11	59		$1\ 041^{99\ 2}$	1130
5064	$C_{16}H_{14}Cl_2N_2O_2$	3, 3′-Dichlorodiacetylbenzidine . .	337 04	302			
5065	$C_{16}H_{14}N_2$	α-Flavaniline	234 12	97			
5066	$C_{16}H_{14}N_2$	Indolin	234 12		245		
5066 1	$C_{16}H_{14}N_2$	1, 5-Diphenyl-3-methylpyrazole .	234 12	63			1199
5067	$C_{16}H_{14}O$	Dypnone	222 11		225^{22}		
5067 1	$C_{16}H_{14}O$	Benzylidene-*p*-tolyl ketone	222 11	77			1289
5068	$C_{16}H_{14}O_2$	Benzyl cinnamate	238 11	34	244^{25}		
5069	$C_{16}H_{14}O_2$	Diphenacyl $C_6H_5COCH_2CH_2COC_6H_5$	238.11	145			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5070	$C_{16}H_{14}O_3$	Guaiacyl cinnamate	254 11	130			
5071	$C_{16}H_{14}O_3$	Phenylacetic anhydride	254 11	117 5			
5072	$C_{16}H_{14}O_3$	*o*-Toluic anhydride $(o\text{-}CH_3C_6H_4CO)_2O$	254 11	39	325		
5073	$C_{16}H_{14}O_4$	Dibenzyl oxalate $(CO_2CH_2C_6H_5)_2$	270 11	81	235^{14}		
5074	$C_{16}H_{14}O_4$	Diphenyl succinate $(CH_2CO_2C_6H_5)_2$	270 11	121	330		
5075	$C_{16}H_{14}O_5$	Brasilin	286 11	250			
5076	$C_{16}H_{14}O_5$	Sakuranetin	286 11	150			
5077	$C_{16}H_{14}O_6$	Diphenyl tartrate $(CHOHCO_2C_6H_5)_2$	302 11	102			
5078	$C_{16}H_{14}O_6$	Hematoxylin	302 11	140			1333
5079	$C_{16}H_{14}O_6$	Hesperetin	302 11	226			
5080	$C_{16}H_{14}O_6$	Homoeriodyctiol	302 11	223			
5081	$C_{16}H_{16}NO_2$	Anisaldazine	254 12	169	180	$1\ 031^{185}$	
5082	$C_{16}H_{16}N_2O_2$	Diacetylbenzidine $(p\text{-}CH_3CONHC_6H_4)_2$	268 14	331			
5082 1	$C_{16}H_{16}N_2O_6$	*o*-Aminophenyl tartrate	332 14	211 d.			
5082 2	$C_{16}H_{16}N_2O_6$	*m*-Aminophenyl tartrate	332 14	175 d.			
5082 3	$C_{16}H_{16}N_2O_6$	*p*-Aminophenyl tartrate	332 14	220 d.			
5082 4	$C_{16}H_{16}N_2O_2$	Diacetylhydrazobenzene	268 15	105			1293
5083	$C_{16}H_{16}N_2S$	Dehydrothioxylidine	268 20		197		
5084	$C_{16}H_{16}N_4O_{10}$	Damascenine picrate	424 16	159			
5085	$C_{16}H_{16}O_2$	*p*-Dimethylbenzoin	240 12	89			
5086	$C_{16}H_{16}O_5$	Anisilic acid	288 12	164			
5087	$C_{16}H_{16}O_3$	Ethyl benzilate	256 12	34	201^{21}		
5088	$C_{16}H_{17}NO_3$	Amygdophenine	271 14	141			
5089	$C_{16}H_{17}NO_4$	Lycorine	287 14	235 d.			
5090	$C_{16}H_{17}NO_4$	Phenetidine salicylacetate	287 14	182			
5091	$C_{16}H_{18}ClNO_4$	Lycorine hydrochloride	323 61	208			
5092	$C_{16}H_{18}N_2$	Azo-*o*-ethylbenzene	238 16	46 5			
5093	$C_{16}H_{18}N_2$	Azo-*p*-ethylbenzene	238 16	63	>340		
5094	$C_{16}H_{18}N_2$	3, 3′-Azo-*o*-xylene	238 16	111			
5095	$C_{16}H_{18}N_2$	4, 4′-Azo-*o*-xylene	238 16	141			
5096	$C_{16}H_{18}N_2$	4, 4′-Azo-*m*-xylene	238 16	129			
5097	$C_{16}H_{18}N_2$	4, 5′-Azo-*m*-xylene	238 16	47			
5098	$C_{16}H_{18}N_2$	5, 5′-Azo-*m*-xylene	238 16	137			
5099	$C_{16}H_{18}N_2$	2, 2′-Azo-*p*-xylene	238 16	119			
5100	$C_{16}H_{18}N_2$	Diphenylpiperazine	238.16	163 5	212^{20}		
5101	$C_{16}H_{18}N_2O$	Paricine.	254.16	130			
5102	$C_{16}H_{18}N_2O_2$	*o*-Azophenetol $(C_2H_5OC_6H_4N:)_2$	270 16	131	240		
5103	$C_{16}H_{18}N_2O_2$	*p*-Azophenetol $(C_2H_5OC_6H_4N:)_2$	270 16	160 2			
5104	$C_{16}H_{18}N_2O_3$	3, 3′-Azoxy-4-methoxytoluene	286 16	149			
5105	$C_{16}H_{18}N_2O_3$	*p*-Azoxyphenetol	286 16	136 9			
5106	$(C_{16}H_{18}N_2O_3)_x$	Bilirubin	$[286\ 16]_x$	192 5			
5107	$C_{16}H_{18}N_2O_3$	Carpiline	286 16	185			
5108	$C_{16}H_{18}N_2O_3$	Hematoporphyrin	286 16	<100 d.			
5109	$C_{16}H_{18}N_2O_3$	Pilosine .	286 16	187			
5110	$C_{16}H_{18}O$	Thymyl phenyl ether	226 14		296 8	1 011	
5111	$C_{16}H_{18}O_2S$	Di-*m*-xylylsulfone	274 20	121			
5112	$C_{16}H_{18}O_7$	Barbaloin .	322.14	148			
5113	$C_{16}H_{19}NO_4$	Benzoylecgonine	289.15	195			
5114	$C_{16}H_{20}N_2$	3-Hydrazo-*o*-xylene	240.17	141			
5115	$C_{16}H_{20}N_2$	4-Hydrazo-*o*-xylene	240 17	107			
5116	$C_{16}H_{20}N_2$	4-Hydrazo-*m*-xylene	240.17	122			
5117	$C_{16}H_{20}N_2$	5-Hydrazo-*m*-xylene	240 17	125			
5118	$C_{16}H_{20}N_2$	2-Hydrazo-*p*-xylene.	240 17	145			
5119	$C_{16}H_{20}N_2O_2$	*o*-Hydrazophenetol $(o\text{-}C_2H_5OC_6H_4NH)_2$	272 17	89			
5123	$C_{16}H_{20}N_4$	*m*-Tetramethyldiaminoazobenzene	268.19	118			
5124	$C_{16}H_{20}O_4$	Phenyl acid camphorate	276 15	100			
5125	$C_{16}H_{20}O_9$	Gentiopicrin .	356.15	191			
5126	$C_{16}H_{21}N_3$	*p*-(Tetramethyldiamino)diphenylamine....	255.19	119			
5127	$C_{16}H_{21}NO_3$	Camphoranilic acid	275 17	204			
5128	$C_{16}H_{21}NO_3$	Homoatropine. . .	275.17	97.5			1333
5129	$C_{16}H_{21}NO_3$	Noratropine. . .	275 17	114			
5130	$C_{16}H_{21}NO_3$	Norhyoscyamine	275 17	140 5			
5131	$C_{16}H_{22}BrNO_3$	Homoatropine hydrobromide.	356.09	212 d.			1333

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5132	$C_{16}H_{22}ClNO_3$	Homoatropine hydrochloride	311.64	217			1333
5133	$C_{16}H_{22}N_4$	*m*-Hydrazodimethylaniline	270.20	100			
5134	$C_{16}H_{22}N_8O_8S$	Caffeine sulfate	486.30				1333
5135	$C_{16}H_{22}O_4$	Di-*n*-butyl phthalate	278.17		340		
5135 1	$C_{16}H_{22}O_4$	Methyl santoate	278.17		86	1.167	1321
5136	$C_{16}H_{22}O_6$	Bilinic acid	310.17	190			
5137	$C_{16}H_{22}O_8$	Coniferin	342.17	185			
5138	$C_{16}H_{22}O_{11}$	*d*-Glucose pentacetate	390.17	113			
5139	$C_{16}H_{23}NO_8$	Bakankosin	357.19	157			
5140	$C_{16}H_{24}O_2$	Methyl santalate	248.19		164^{10}	1.002	
5141	$C_{16}H_{26}$	Pentaethylbenzene	218.20	<-20	277	0.896	655
5142	$C_{16}H_{26}O$	Patchouli alcohol	234.20	56	271 d.	0.994_4^{70}	
5142 1	$C_{16}H_{26}O$	Guaiol	234.20	91			1176
5143	$C_{16}H_{26}O_2$	Menthyl *l*-sorbinate	250.20		173^{14}		
5143 1	$C_{16}H_{26}O_8$	Diisobutyl *d*-diacetyl tartrate	346.20		$157^{3.5}$	1.0864^{17}	
5144	$C_{16}H_{27}ClN_2O_2$	Alypin hydrochloride	314.68	169			
5145	$C_{16}H_{27}N_3O_5$	Alypin nitrate	341.23	152			
5146	$C_{16}H_{28}N_2$	Genisteine	248.23	60.5	178^{22}		
5147	$C_{16}H_{28}O_2$	Hydrocarpic acid	252.22	60			
5148	$C_{16}H_{28}O_2$	Palmitolic acid	252.22	47	240^{15}		
5149	$C_{16}H_{28}O_4$	Palmitoxylic acid	284.22	67			
5150	$C_{16}H_{30}O_2$	Gaidic acid	251.23	39			
5151	$C_{16}H_{30}O_2$	Hypogaeic acid	254.23	33	236^{15}		
5152	$C_{16}H_{30}O_2$	*l*-Menthyl *n*-capronate	254.23		153^{15}	0.903	
5153	$C_{16}H_{30}O_3$	*n*-Caprylic anhydride $(C_8H_{15}CO)_2O$	270.23	-1	285		
5154	$C_{16}H_{30}O_3$	7-Ketopalmitic acid	270.23	74			
5155	$C_{16}H_{31}N$	Palmitonitrile $CH_3(CH_2)_{13}CH_2CN$	237.25	29	251.5^{100}	0.822_4^{21}	
5156	$C_{16}H_{32}$	α-Hexadecylene $CH_2{:}CH(CH_2)_{13}CH_3$	224.25	4	274	0.789	388
5157	$C_{16}H_{32}N_2O_6S$	Pelletierine sulfate	380.33	133			
5158	$C_{16}H_{32}O$	Palmitic aldehyde $C_{15}H_{31}CHO$	240.25	58.5	202^{29}		
5159	$C_{16}H_{32}O_2$	Palmitic acid $C_{15}H_{31}CO_2H$	256.25	64	215^{15}	0.853_4^{62}	1113
5160	$C_{16}H_{32}O_2$	Ethyl myristate $C_{13}H_{27}CO_2C_2H_5$	256.25	10.5	295		
5161	$C_{16}H_{32}O_3$	Jalapinolic acid	272.25	68			
5162	$C_{16}H_{32}O_3$	Juniperic acid	272.25	95			
5163	$C_{16}H_{32}O_3$	Lanopalmic acid	272.25	88			
5164	$C_{16}H_{33}I$	*n*-Cetyl iodide $C_{15}H_{31}CH_2I$	352.19	22	212.5^{15}	1.123	535
5165	$C_{16}H_{33}NO$	Palmitic amide $C_{15}H_{31}CONH_2$	255.26	106	236^{12}		
5166	$C_{16}H_{34}$	7, 8-Dimethyltetradecane	226.26		267.5	0.792^{14}	
5167	$C_{16}H_{34}$	*n*-Hexadecane	226.26	20	287.5	0.775	
5168	$C_{16}H_{34}O$	Cetyl alcohol $C_{15}H_{31}CH_2OH$	242.26	49.3	344	$0.798_4^{78.9}$	1108
5169	$C_{16}H_{34}O$	*n*-Octyl ether $(C_8H_{17})_2O$	242.26		291.8	0.820	
5171	$C_{17}H_{10}O$	Benzanthrone	230.08	170			
5172	$C_{17}H_{11}N$	α-Anthraquinoline	229.09	170	446		
5173	$C_{17}H_{12}O$	Phenyl α-naphthyl ketone	232.09	75.5	385		
5174	$C_{17}H_{12}O$	Phenyl β-naphthyl ketone	232.09	82			
5175	$C_{17}H_{12}O_2$	Chrysenic acid	248.09	186.5			
5176	$C_{17}H_{12}O_2$	α-Naphthyl benzoate	248.09	56			
5177	$C_{17}H_{12}O_2$	β-Naphthyl benzoate	248.09	110			
5178	$C_{17}H_{12}O_3$	α-Naphthyl salicylate	264.09	83			
5179	$C_{17}H_{12}O_3$	β-Naphthyl salicylate	264.09	95			
5180	$C_{17}H_{12}O_5$	Alpinin	296.09	174			
5181	$C_{17}H_{12}O_5$	Pratensol	296.09	225			
5182	$C_{17}H_{13}NO_2$	6-Methyl-2-phenylquinoline-4-carboxylic acid	263.11	228			
5183	$C_{17}H_{14}$	α-Benzylnaphthalene	218.11	59	350	1.165^{0}	
5184	$C_{17}H_{14}$	β-Benzylnaphthalene	218.11	35.5	350	1.176^{0}	
5185	$C_{17}H_{14}O$	Dibenzylideneacetone	234.11	112			
5186	$C_{17}H_{14}O_2$	Atronic acid	250.11	164			
5187	$C_{17}H_{14}O_2$	Isatronic acid	250.11	157			
5188	$C_{17}H_{14}O_4$	Nepalin	282.11	136			
5189	$C_{17}H_{15}N_5O_9$	Tryptophane picrate	433.16	196 s. d.			
5190	$C_{17}H_{16}$	1, 2, 4-Trimethylanthracene	220.12	243			
5191	$C_{17}H_{16}$	1, 3, 6-Trimethylanthracene	220.12	222			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5192	$C_{17}H_{14}$	1, 4, 6-Trimethylanthracene	220.12	227			
5193	$C_{17}H_{16}O_3$	Eugenol benzoate ..	268.12	70	360		
5194	$C_{17}H_{16}O_3$	Isoeugenol benzoate	268.12	104			
5195	$C_{17}H_{16}O_4$	Dibenzyl malonate.	284.12		234.5^{14} d.		
5196	$C_{17}H_{17}NO_2$	Apomorphine......	267.14	170 d.			
5197	$C_{17}H_{18}ClNO_2$	Apomorphine hydrochloride	303.61	210			1333
5198	$C_{17}H_{18}N_2O_3$	Antipyrine resorcinate	298.16	115			
5199	$C_{17}H_{18}O$	Dibenzylacetone $CO(CH_2CH_2C_6H_5)_2$	238.14		224^{18}		
5200	$C_{17}H_{18}O_2$	Eugenol benzyl ether	254.14	30	235 d.		
5201	$C_{17}H_{18}O_2$	Isoeugenol benzyl ether	254.14	59			
5202	$C_{17}H_{19}NO_3$	Morphine	285.15	d.	193^{vac}	1.317	1277
5203	$C_{17}H_{19}NO_3$	*α*-Isomorphine........	285.15	247			
5204	$C_{17}H_{19}NO_3$	Piperine	285.15	129.5			
5205	$C_{17}H_{20}BrNO_3$	Morphine hydrobromide	366.08				1333
5206	$C_{17}H_{20}ClNO_3$	Morphine hydrochloride	321.62	250 d			1333
5207	$C_{17}H_{20}N_2O$	Tetramethyldiaminobenzophenone	268.17	174	>360 s. d		
5208	$C_{17}H_{20}N_2O_3$	Nicotine salicylate	300.17	117.5			1333
5209	$C_{17}H_{20}N_2O_4$	*l*-Arabinose diphenylhydrazone	316.17	218			
5211	$C_{17}H_{20}N_2S$	3, 3-Tetramethyldiaminothiobenzophenone	284.24	202			
5212	$C_{17}H_{20}N_4O_3$	*l*-Arabinosazone	340.19	166	200 d.		
5213	$C_{17}H_{20}N_4O_3$	*d*-Xylosephenylosazone	328.19	164	167 d.		
5213.1	$C_{17}H_{20}O_2$	Di-(*p*-dianisyl)dimethylmethane	256.15	60.5		1.150	1204
5214	$C_{17}H_{20}O_7$	Tutin .	336.15	208			
5215	$C_{17}H_{20}O_{10}$	Patellaric acid	384.15	100			
5216	$C_{17}H_{21}NO_2$	Apoatropine	271.17	62			
5217	$C_{17}H_{21}NO_3$	Dihydromorphine	287.17	157			
5218	$C_{17}H_{21}NO_4$	Atroscine .	303.17	50			
5219	$C_{17}H_{21}NO_4$	*α*-Cocaine. . .	303.17	88			
5220	$C_{17}H_{21}NO_4$	*dl*-Cocaine . .	303.17	80			
5221	$C_{17}H_{21}NO_4$	*d*(*l*)-Cocaine .	303.17	98			1326
5222	$C_{17}H_{21}NO_4$	Hyoscine	303.17	55			1333
5223	$C_{17}H_{21}NO_4$	*dl*-Pseudococaine	303.17	81.5		1.103$^{99.5}$	1139
5224	$C_{17}H_{21}NO_4$	*d*-Pseudococaine	303.17	41		1.102$^{99.6}$	1142
5225	$C_{17}H_{21}N_3$	Auramine . .	267.19	136			
5226	$C_{17}H_{22}BrNO_4$	Hyoscine hydrobromide	384.09	194			1333
5227	$C_{17}H_{22}ClNO_2$	Apoatropine hydrochloride	307.64	239			1333
5228	$C_{17}H_{22}ClNO_4$	Cocaine hydrochloride	339.64	187			1257
5229	$C_{17}H_{22}ClNO_4$	Hyoscine hydrochloride ..	339.64				1333
5230	$C_{17}H_{22}N_2$	*p*-(Tetramethyldiamino)-diphenylmethane.	254.19	91			
5231	$C_{17}H_{22}N_2O$	*p*-(Tetramethyldiamino)-diphenyl carbinol $[p\text{-}(CH_3)_2NC_6H_4]_2CHOH$	270.19	96			
5232	$C_{17}H_{22}O_3$	Podocarpic acid..	274.17	188			
5233	$C_{17}H_{22}O_5$	Guaiacyl acid camphorate	306.17	112			
5234	$C_{17}H_{22}O_9$	Syringin........ ..	370.17	192			
5235	$C_{17}H_{23}NO_3$	Atropine......	289.19	115.5			1333
5236	$C_{17}H_{23}NO_3$	*d*-Hyoscyamine.	289.19	106			
5237	$C_{17}H_{23}NO_3$	Pseudoatropine .	289.19	120			
5238	$C_{17}H_{24}BrNO_3$	Atropine hydrobromide	370.11	162			1333
5239	$C_{17}H_{24}BrNO_3$	Hyoscyamine hydrobromide	370.11	152			1333
5240	$C_{17}H_{24}ClNO_3$	Atropine hydrochloride	325.65	165			1333
5241	$C_{17}H_{24}ClNO_3$	Hyoscyamine hydrochloride	325.65				1333
5242	$C_{17}H_{24}N_2O_5S$	Sinapine thiocyanate	368.27	176			
5243	$C_{17}H_{24}N_2O_6$	Atropine nitrate	352.20				1333
5244	$C_{17}H_{24}O_2$	Menthyl benzoate .	260.19	54.5	288	0.808	
5244.1	$C_{17}H_{24}O_4$	Ethyl santoate .	292.19	89		1.148	1322
5245	$C_{17}H_{24}O_{10}$	Verbenalin........ .	388.19	181.6			
5246	$C_{17}H_{25}NO_3$	Euphthalmine......... .	291.20	113			
5247	$C_{17}H_{26}O_4$	Scillitin................. . .	325.19	154			
5248	$C_{17}H_{26}ClNO_3$	Euphthalmine hydrochloride .	327.67	183			
5249	$C_{17}H_{26}O$	Benzylmenthol...................	246.20	111	183^{10}		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I No.
5250	$C_{17}H_{28}O$	Phellyl alcohol	248 22	100			
5251	$C_{17}H_{29}NO_2$	Ajaconine..	279 23	163			
5252	$C_{17}H_{30}O_9$	Jalapic acid	378 23	120			
5253	$C_{17}H_{32}O_2$	*l*-Menthyl heptylate	268 25		165^{15}	0 901	
5254	$C_{17}H_{34}$	8-Heptadecene $C_7H_{15}CH{:}CHC_8H_{17}$	238 26		$160^{9.5}$	0.798^{10}	
5255	$C_{17}H_{34}O$	Margaric aldehyde $C_{16}H_{33}CHO$	254 26	36	204^{26}		
5256	$C_{17}H_{34}O_2$	Daturic acid .	270 26	60	227^{100}		
5257	$C_{17}H_{34}O_2$	Margaric acid $C_{16}H_{33}CO_2H$.	270 26	59 9	227^{100}	0.853^{60}	
5258	$C_{17}H_{34}O_2$	Methyl palmitate $C_{15}H_{31}CO_2CH_3$	270 26	29 5	196^{15}		1119
5259	$C_{17}H_{35}NO_2$	Sphingosine	285 28	244	250 d.		
5260	$C_{17}H_{36}$	*n*-Heptadecane $CH_3(CH_2)_{15}CH_3$	240 28	22 5	303	0 778	359
5261	$C_{17}H_{36}O$	Heptadecane-9-ol $C_8H_{17}CH(OH)C_8H_{17}$	256 28	61			
5262	$C_{17}H_{37}N$	Heptadecylamine $C_{17}H_{35}NH_2$	255 29	49	340		
5263	$C_{18}H_{12}$	Benzanthrene	228 09	84			
5264	$C_{18}H_{12}$	Chrysene	228 09	251	448		
5265	$C_{18}H_{12}$	Triphenylene ..	228 09	198 5			
5266	$C_{18}H_{12}$	Truxene	228 09	>360			
5267	$C_{18}H_{12}N_2$	2, 3′-Diquinolyl	256 11	176			
5268	$C_{18}H_{12}N_2$	2, 7′-Diquinolyl	256 11	193			
5269	$C_{18}H_{12}N_2$	6, 6′-Diquinolyl	256 11	178			
5270	$C_{18}H_{12}N_2$	8, 8′-Diquinolyl	256 11	205			
5271	$C_{18}H_{12}O_3$	*o*-(*α*-Naphthoyl) benzoic acid	276 09	173 5			
5272	$C_{18}H_{12}O_6$	Calycin	308 09	240			
5273	$C_{18}H_{13}N$	Aminochrysene	243 11	203			
5274	$C_{18}H_{14}$	*p*-Diphenylbenzene $C_6H_4(C_6H_5)_2$	230 11	205	427		
5275	$C_{18}H_{14}O_3$	Cinnamic anhydride $(C_6H_5CH{:}CHCO)_2O$	278 11	135			
5276	$C_{18}H_{14}O_4$	Epicarin	294 11	195			
5277	$C_{18}H_{14}O_7$	Xanthoeridol . . .	342 11	258			
5278	$C_{18}H_{14}O_8$	Diaspirin (Succinyldisalicylic acid)	358 11	178			
5279	$C_{18}H_{15}As$	Triphenylarsine $(C_6H_5)_3As$	306 08	60			
5280	$C_{18}H_{15}Bi$	Triphenyl bismuthine $(C_6H_5)_3Bi$	440 16	78		$1\ 585^{20}$	
5281	$C_{18}H_{15}N$	Triphenylamine $(C_6H_5)_3N$. .	245 12	126 5	365	$0\ 774_0^0$	
5282	$C_{18}H_{15}O_3P$	Triphenyl phosphite $(C_6H_5O)_3P$....	310 14		220^{11}	$1\ 184^{18}$	
5283	$C_{18}H_{15}O_4P$	Triphenyl phosphate $(C_6H_5O)_3PO$...	326 14	49 9	245^{11}		
5284	$C_{18}H_{15}P$	Triphenylphosphine $(C_6H_5)_3P$.	262 14	79	>360	1 194	
5285	$C_{18}H_{15}Sb$	Triphenylstibine $(C_6H_5)_3Sb$	352 89	48	>360	$1\ 500^{11}$	
5286	$C_{18}H_{16}NO_2$	Aporheine	278 13	89	290 d.		
5287	$C_{18}H_{16}N_2$	Diphenyl-*m*-phenylenediamine . . .	260 14	95			
5288	$C_{18}H_{16}N_2$	Triphenylhydrazine $(C_6H_5)_2NNHC_6H_5$..	260 14	142		$0\ 869_4^{70}$	
5289	$C_{18}H_{16}N_2O_2$	Analgèn	292 14	210			
5290	$C_{18}H_{16}N_2O_3$	5, 5′-Dibenzylbarbituric acid	308 14	222			
5291	$C_{18}H_{16}N_2O_6S$	Chinosol	388 20	177 5			
5292	$C_{18}H_{16}O_2$	Cinnamyl cinnamate	264 12	44		$1\ 085^{16.5}$	
5293	$C_{18}H_{16}O_4$	*α*-Isatropic acid	296 12	237			
5294	$C_{18}H_{16}O_4$	*β*-Isatropic acid	296 12	206			
5295	$C_{18}H_{16}O_4$	*α*-Truxillic acid	296 12	272			
5296	$C_{18}H_{16}O_4$	Isotruxillic acid	296.12	206			
5297	$C_{18}H_{16}O_4$	*γ*-Truxillic acid	296 12	228			
5298	$C_{18}H_{16}O_4$	*δ*-Truxillic acid	296.12	174			
5299	$C_{18}H_{16}O_4$	*ε*-Truxillic acid	296 12	192			
5300	$C_{18}H_{16}O_4$	*η*-Truxillic acid	296 12	260			
5301	$C_{18}H_{16}O_4$	Dibenzyl fumarate	296 12	59 5	211^5		
5302	$C_{18}H_{16}O_4$	Nepodin . .	296 12	158			
5303	$C_{18}H_{16}O_7$	*dl*-Usnic acid	344 12	193			
5304	$C_{18}H_{16}O_7$	*d*(*l*)-Usnic acid	344.12	203			1295
5305	$C_{18}H_{16}O_{14}$	Igasuric acid (Chlorogenic acid) ..	456 12	207			
5306	$C_{18}H_{18}$	Retene	234 14	98 5	394	$1\ 13^{16}$	
5307	$C_{18}H_{18}$	1, 3, 5, 7-Tetramethylanthracene	234 14	280 d.			
5308	$C_{18}H_{18}N_2O_4$	Antipyrine salicylate ..	326 16	92			
5308 1	$C_{18}H_{18}N_8$	Vesuvin	346 20	143 5			
5310	$C_{18}H_{18}O_4$	Dibenzyl succinate	298 14	45	238^{14}		
5312	$C_{18}H_{19}NO_3$	Berbamine	297 15	200			
5313	$C_{18}H_{19}N_3O_2$	Dimazon (Diacetylaminoazotoluene)..	309 17	75			
5314	$C_{18}H_{20}BrNO_2$	Apomorphine methobromide	362.08	180			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5315	$C_{18}H_{20}N_2O_2$	Cinchotenine	312.17	198			
5316	$C_{18}H_{21}NO_3$	Bebeerine	299.17	214			
5317	$C_{18}H_{21}NO_3$	Codeine	299.17	155	179	1.315^{14}	1283, 1286
5318	$C_{18}H_{21}NO_3$	Isobebeerine	299.17	297			
5319	$C_{18}H_{21}NO_3$	Isocodeine	299.17	144	d		1288
5320	$C_{18}H_{21}NO_3$	Pseudocodeine	299.17	181		1.290^{180}	1264
5321	$C_{18}H_{22}BrNO_3$	Codeine hydrobromide	380.09				1333
5322	$C_{18}H_{22}BrNO_3$	Morphine methylbromide	380.09	265 d			
5323	$C_{18}H_{22}ClNO_3$	Bebeerine hydrochloride	335.64	260			
5324	$C_{18}H_{22}ClNO_3$	Codeine hydrochloride	335.64	264			1333
5325	$C_{18}H_{22}N_2O_2$	Holocaine	298.19	117			
5325.1	$C_{18}H_{22}N_2O_5$	Pilocarpine salicylate	346.19	120			1333
5326	$C_{18}H_{22}N_4O_4$	Galactosazone	358.20	201	202 d.		
5327	$C_{18}H_{22}N_4O_4$	*d*-Glucosazone	358.20	208 d			
5328	$C_{18}H_{22}N_4O_4$	*l*-Glucosazone	358.20	205 d			
5329	$C_{18}H_{22}N_4O_4$	Gulososazone	358.20	168	180 d.		
5330	$C_{18}H_{22}O_{10}$	Murrayin	398.17	170			
5331	$C_{18}H_{23}ClN_2O_2$	Holocaine hydrochloride	334.65	189			
5332	$C_{18}H_{23}NO_6$	Cocaine formate	349.19	42			
5333	$C_{18}H_{24}NO_7P$	Codeine phosphate	397.22	235			1333
5334	$C_{18}H_{26}O_2$	Menthyl phenylacetate	274.20		205.5^{25}	1.002	
5335	$C_{18}H_{26}O_4$	Diamyl phthalate ..	306.20		344		
5336	$C_{18}H_{27}NO_3$	Capsaicin	305.22	65			1226
5337	$C_{18}H_{27}NO_8$	Senecifoline	385.22	194			
5338	$C_{18}H_{28}ClNO_8$	Senecifoline hydrochloride	421.68	260			
5339	$C_{18}H_{28}O_4$	Embellic acid	308.22	142			
5340	$C_{18}H_{30}$	Hexaethylbenzene $C_6(C_2H_5)_6$	246.23	129	298	$0.831_4^{130.4}$	1159
5341	$C_{18}H_{30}O$	Sycoceryl alcohol	262.23	90			
5342	$C_{18}H_{30}O_2$	Linolenic acid	278.23		232^{17}	0.914	
5343	$C_{18}H_{31}ClN_2O_6$	*dl*-Ecgonine hydrochloride	406.71	247			
5343.1	$C_{18}H_{32}$	Fichtelite.	248.25	46		1.010	1247
5344	$C_{18}H_{32}O_2$	Chaulmoogric acid	280.25	69	248^{20}		
5345	$C_{18}H_{32}O_2$	α-Eleostearic acid	280.25	49	235^{12}		
5346	$C_{18}H_{32}O_2$	Linoleic acid	280.25	< −18	230^{16}	0.903	
5347	$C_{18}H_{32}O_2$	Stearolic acid $C_8H_{17}C{:}C(CH_2)_7CO_2H$	280.25	48	260		
5348	$C_{18}H_{32}O_2$	Tariric acid.	280.25	50.5			
5349	$C_{18}H_{32}O_4$	Stearoxylic acid	312.25	86			
5350	$C_{18}H_{32}O_{16}$	Raffinose ...	504.25	119	130 d.	1.465	
5351	$C_{18}H_{32}O_{16}$	Procellose	504.25	210			
5352	$C_{18}H_{33}N_2O_{12}$	Piperazine quinate (Sidonal)	469.27	171			
5353	$C_{18}H_{34}$	Hexadecylacetylene $C_{16}H_{33}C{:}CH$	250.26	26	180^{15}	0.798^{26}	
5354	$C_{18}H_{34}$	1-Methyl-2-pentadecylacetylene	250.26	30	184^{15}	0.802	
5355	$C_{18}H_{34}O$	Chaulmoogryl alcohol	266.26	36			
5356	$C_{18}H_{34}O$	Oleic aldehyde	266.26		160^{4}	0.851^{15}	456
5357	$C_{18}H_{34}O_2$	Elaidic acid	282.26	51.5	288^{100}	$0.851^{79.4}$	
5358	$C_{18}H_{34}O_2$	Gynocardic acid	282.26	67.5			
5359	$C_{18}H_{34}O_2$	Oleic acid $C_8H_{17}CH{:}CH(CH_2)_7CO_2H$	282.26	14	286^{100}	$0.895_4^{17.7}$	929
5360	$C_{18}H_{34}O_2$	Petroselinic acid . ..	282.26	34		0.868^{40}	1057
5361	$C_{18}H_{34}O_2$	Rapic acid	282.26	14		0.897^{15}	
5362	$C_{18}H_{34}O_2$	*l*-Menthyl *n*-caprylate	282.26		175^{15}	0.898	
5363	$C_{18}H_{34}O_3$	3-Ketostearic acid.	298.26	97			
5364	$C_{18}H_{34}O_3$	6-Ketostearic acid	298.26	75			
5365	$C_{18}H_{34}O_3$	8-Ketostearic acid	298.26	83			
5366	$C_{18}H_{34}O_3$	9-Ketostearic acid	298.26	76			
5367	$C_{18}H_{34}O_3$	10-Ketostearic acid	298.26	65			
5368	$C_{18}H_{34}O_3$	Ricinelaidic acid	298.26	53	250^{15}		
5369	$C_{18}H_{34}O_3$	Ricinic acid	298.26	81	252^{15}		
5370	$C_{18}H_{34}O_3$	Ricinoleic acid	298.26	17	250^{15}	0.945^{15}	
5371	$C_{18}H_{34}O_5$	Oleic acid ozonide	330.26			1.022	472
5371.1	$C_{18}H_{34}O_6$	Di-*n*-heptyl tartrate .	346.26	35	235^{14}	0.999^{41}	
5372	$C_{18}H_{34}O_{16}$	Clavisepsin......... .	506.26	198			
5373	$C_{18}H_{35}ClO$	Stearyl chloride $C_{17}H_{35}COCl$ . .	302.73	23	215^{15}		
5374	$C_{18}H_{35}N$	Stearonitrile $C_{17}H_{35}CN$...	265.28	41	214^{13}		

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5375	$C_{18}H_{35}NO$	Oleicamide	281.28	76			
5376	$C_{18}H_{35}NO_2$	Oleohydroxamic acid	297.28	61			
5377	$C_{18}H_{36}$	*n*-Octodecylene	252.28	18	179^{15}	0.791	
5378	$C_{18}H_{36}O$	Stearic aldehyde $C_{17}H_{35}CHO$	268.28	63.5	261^{100}		
5379	$C_{18}H_{36}O_2$	Stearic acid $C_{17}H_{35}CO_2H$	284.28	69.3	383	$0.847^{69.3}$	1117
5380	$C_{18}H_{36}O_2$	Cetyl acetate $CH_3CO_2C_{16}H_{33}$.	284.28	18.5	200.5^{15}	0.858	1041
5381	$C_{18}H_{36}O_2$	Ethyl palmitate $C_{15}H_{31}CO_2C_2H_5$	284.28	24.2	185.5^{10}		1043
5382	$C_{18}H_{36}O_2$	Methyl margarate	284.28	29			
5383	$C_{18}H_{36}O_3$	1-Hydroxystearic acid	300.28	85			
5384	$C_{18}H_{36}O_3$	*dl*-2-Hydroxystearic acid	300.28	85			
5385	$C_{18}H_{36}O_3$	9-Hydroxystearic acid	300.28	81.5			
5386	$C_{18}H_{36}O_3$	10-Hydroxystearic acid	300.28	79			
5387	$C_{18}H_{36}O_3$	11-Hydroxystearic acid	300.28	78			
5388	$C_{18}H_{36}O_4$	4, 9-Dihydroxystearic acid	316.28	136.5			
5389	$C_{18}H_{37}I$	*n*-Octodecyl iodide . . .	380.22	34	$170^{0.5}$		
5390	$C_{18}H_{37}NO$	Stearic amide $C_{17}H_{35}CONH_2$	283.29	109	251^{12}		
5391	$C_{18}H_{38}$	*n*-Octadecane $CH_3(CH_2)_{16}CH_3$	254.29	28	317	0.777	1047
5392	$C_{18}H_{38}O$	*n*-Octadecyl alcohol	270.29	58.5	210.5^{15}	0.812_4^{59}	
5394	$C_{19}H_{12}O$	Benzylideneacenaphthenone	256.09	107			
5395	$C_{19}H_{13}N$	9-Phenylacridine	255.11	181	404		
5396	$C_{19}H_{13}N_3O_6$	Tri-*p*-nitrophenylmethane	379.12	207			
5397	$C_{19}H_{14}O_3$	Aurine	290.11	>220			
5398	$C_{19}H_{14}O_6$	Oroxylin .	338.11	225			
5399	$C_{19}H_{15}$	Triphenylmethyl $(C_6H_5)_3C$	243.12	147			
5400	$C_{19}H_{15}Cl$	Triphenylchloromethane $(C_6H_5)_3CCl$	278.57	112	310		
5401	$C_{19}H_{15}N_3$	Chrysaniline .	285.14	270			
5402	$C_{19}H_{16}$	Triphenylmethane $(C_6H_5)_3CH$.	244.12	92.5	359.2	1.014_4^{99}	1128
5403	$C_{19}H_{16}N_2$	Benzophenone phenylhydrazone. . . .	272.14	137			
5404	$C_{19}H_{16}O$	Triphenyl carbinol $(C_6H_5)_3COH$. . .	260.12	162.5	>360	1.188	
5405	$C_{19}H_{16}O_3$	Triphenyl orthoformate $HC(OC_6H_5)_3$.	292.12	77	277^{55}		
5406	$C_{19}H_{17}N$	*m*-Aminotriphenylmethane .	259.14	120			
5407	$C_{19}H_{17}N$	*p*-Aminotriphenylmethane	259.14	84			
5408	$C_{19}H_{17}N$	Diphenylbenzylamine	259.14	87			
5409	$C_{19}H_{17}N$	Triphenylmethylamine $(C_6H_5)_3C.NH_2$	259.14	105			
5410	$C_{19}H_{17}NO_2$	Novatophan	291.14	76			
5411	$C_{19}H_{17}NO_3$	Cusparidine	307.14	79			
5412	$C_{19}H_{17}NO_3$	Cusparine	307.14	92			
5413	$C_{19}H_{17}NO_3$	Isocusparine . . .	307.14	194			
5414	$C_{19}H_{17}N_3$	α-Triphenylguanidine	287.16	145	d.		
5415	$C_{19}H_{17}N_3$	β-Triphenylguanidine	287.16	131			
5416	$C_{19}H_{18}ClN_3$	α-Triphenylguanidine hydrochloride	323.62	241		0.875_4^{70}	
5417	$C_{19}H_{18}N_2$	*p*, *p*′-Diaminotriphenylmethane	274.16	140			
5418	$C_{19}H_{18}O_3$	Eugenol cinnamate	294.14	90			
5419	$C_{19}H_{18}O_7$	Eriodonol	358.14	199			
5420	$C_{19}H_{18}O_8$	Atranoric acid	374.14	197			
5421	$C_{19}H_{18}O_{11}$	Euxanthic acid	422.14	162	d.		
5422	$C_{19}H_{19}NO_2$	Ditamine	293.15	75			
5423	$C_{19}H_{19}NO_3$	Galipidine	309.15	111			
5424	$C_{19}H_{19}NO_4$	Bulbocapnine	325.15	199			1332
5425	$C_{19}H_{19}NO_5$	Stylopine	341.15	202			
5426	$C_{19}H_{19}N_3$	*o*-Leucaniline $(NH_2C_6H_4)_3CH$	289.17	165			
5427	$C_{19}H_{19}N_3$	*p*-Leucaniline $(NH_2C_6H_4)_3CH$	289.17	148			
5428	$C_{19}H_{19}N_3O$	Pararosaniline $(NH_2C_6H_4)_3C(OH)$.	305.17	189			
5428.1	$C_{19}H_{20}N_2O$	Cinchoninone . . .	292.17	127		1.226	1301
5429	$C_{19}H_{20}N_2O_4$	Antipyrine mandelate	340.17	53			
5430	$C_{19}H_{20}N_2O_4$	*dl*-Ornithuric acid.	340.17	183			
5431	$C_{19}H_{20}O_4$	Diethyl diphenylmalonate	312.15	59			
5432	$C_{19}H_{20}O_5$	Guaiaconic acid	328.15	100			
5433	$C_{19}H_{21}NO_3$	Isothebaine	311.17	204			
5434	$C_{19}H_{21}NO_3$	Oxyacanthine	311.17	210			
5435	$C_{19}H_{21}NO_3$	Thebaine .	311.17	193		1.305	
5436	$C_{19}H_{21}NO_5$	Eupyrin . .	343.17	88			
5437	$C_{19}H_{22}N_2$	Desoxycinchonidine	278.19	61			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5438	$C_{19}H_{22}N_2$	Desoxycinchonine.	278.19	92			
5439	$C_{19}H_{22}N_2O$	Apocinchonine	294.19	228			
5440	$C_{19}H_{22}N_2O$	Cinchonicine.	294.19	59			
5441	$C_{19}H_{22}N_2O$	Cinchonidine	294.19	210			1278
5442	$C_{19}H_{22}N_2O$	α-Cinchonine .. .	294.19	264.3			1304
5443	$C_{19}H_{22}N_2O$	Homocinchonidine	294.19	207.6			
5444	$C_{19}H_{22}N_2O$	β-Isocinchonine	294.19	126			
5445	$C_{19}H_{22}N_2O_2$	Apoconquinine	310.19	137			
5446	$C_{19}H_{22}N_2O_2$	Apoquinine	310.19	210 d.			
5447	$C_{19}H_{22}N_2O_2$	Cupreine	310.19	202			
5448	$C_{19}H_{22}N_2O_4$	Chitenine .	342.19	286 d.			
5451	$C_{19}H_{23}ClN_2O$	Cinchonidine hydrochloride	330.65	242 d			
5452	$C_{19}H_{23}ClN_2O$	Cinchonine hydrochloride	330.65	218 d.			1333
5453	$C_{19}H_{23}NO_3$	Codethyline	313.19	93			
5454	$C_{19}H_{23}NO_4$	Cinnamylcocaine	329.19	121			
5455	$C_{19}H_{23}NO_4$	Corytuberine	329.19	240			
5456	$C_{19}H_{23}NO_4$	Porphyroxine	329.19	135			
5457	$C_{19}H_{23}NO_4$	Sinomenine..	329.19	161			
5458	$C_{19}H_{23}NO_5$	Morphine acetate.	345.19	200 d			
5459	$C_{19}H_{23}N_3O_4$	Cinchonine nitrate	357.20				1333
5460	$C_{19}H_{24}BrNO_3$	Eucodine (Methylcodeine bromide)	394.11	261			
5461	$C_{19}H_{24}ClNO_3$ $(2H_2O)$	Dionine.... .	349.65	123	170 d		
5462	$C_{19}H_{24}N_2O$	Cinchamidine (Hydrocinchonidine)	296.20	230			
5463	$C_{19}H_{24}N_2O$	Cinchonamine	296.20	185			
5464	$C_{19}H_{24}N_2O$	Cinchotine	296.20	286			
5465	$C_{19}H_{24}N_2O$	Pereirine .	296.20	124			
5466	$C_{19}H_{24}N_2O_2$	Conquinamine	312.20	123			
5467	$C_{19}H_{24}N_2O_2$	Geissospermine	312.20	189			
5468	$C_{19}H_{24}N_2O_2$	Hydrocupreine	312.20	230			
5469	$C_{19}H_{24}N_2O_2$	Quinamine.	312.20	172			
5473	$C_{19}H_{25}N_4O_4$	Ionidine...	373.23	156			
5474	$C_{19}H_{26}N_2O$	Aspidosine	298.22	245			
5475	$C_{19}H_{27}NO_4$	α-Eucaine . .	333.22	103			
5476	$C_{19}H_{28}ClNO_4$	α-Eucaine hydrochloride	369.68	200			
5477	$C_{19}H_{28}O_2$	Abietic acid .	288.22	161			1251
5478	$C_{19}H_{28}O_4$	Convallaretin	320.22	>255			
5479	$C_{19}H_{28}O_{13}$	Calmatambin ..	464.22	144			
5480	$C_{19}H_{30}O_2$	Benzyl laurate $C_{11}H_{23}CO_2CH_2C_6H_5$.	290.23	8.5	211^{12}	0.946^{25}_{25}	540
5481	$C_{19}H_{34}O_2$	Methyl chaulmoograte	294.26	22	227^{20}	0.912^{25}_{25}	
5482	$C_{19}H_{36}O_3$	Methyl ricinolate	312.28		245^{10}	0.924	465
5483	$C_{19}H_{38}O_2$	Nondecylic acid $CH_3(CH_2)_{17}CO_2H$	298.29	66	299^{100}		
5484	$C_{19}H_{38}O_2$	Ethyl margarate $CH_3(CH_2)_{15}CO_2C_2H_5$.	298.29	27			
5485	$C_{19}H_{38}O_2$	Methyl stearate $C_{17}H_{35}CO_2CH_3$	298.29	38	215^{15}		
5486	$C_{19}H_{40}$	*n*-Nondecane $CH_3(CH_2)_{17}CH_3$.	268.31	32	330	0.777^{32}_{4}	1045
5487	$C_{20}H_{10}I_4O_4$	Nosophen (Tetraiodophenolphthalein)	821.81	225			
5488	$C_{20}H_{12}$	Perylene	252.09	264			
5489	$C_{20}H_{12}O_3$	Fluoran.....	300.09	175			
5490	$C_{20}H_{12}O_5$	Fluorescein .	332.09		290 d.		
5491	$C_{20}H_{14}$	α, α′-Dinaphthyl $C_{10}H_7.C_{10}H_7$	254.11	160.5	360		
5492	$C_{20}H_{14}$	α, β′-Dinaphthyl	254.11	80			
5493	$C_{20}H_{14}$	β, β′-Dinaphthyl $C_{10}H_7.C_{10}H_7$	254.11	187.8	452		
5494	$C_{20}H_{14}$	9-Phenylanthracene	254.11	153	417		
5495	$C_{20}H_{14}N_2$	α, α′-Azonaphthalene.	282.12	190			
5496	$C_{20}H_{14}N_2$	β, β′-Azonaphthalene .	282.12	204			
5497	$C_{20}H_{14}N_2O$	α, α′-Azoxynaphthalene .	298.12	127			
5498	$C_{20}H_{14}N_2O$	β, β′-Azoxynaphthalene......	298.12	167			
5499	$C_{20}H_{14}O$	α-Naphthyl ether $(C_{10}H_7)_2O$	270.11	110	>360		
5500	$C_{20}H_{14}O$	β-Naphthyl ether $(C_{10}H_7)_2O$	270.11	105	250^{19}		
5501	$C_{20}H_{14}O$	α, β′-Naphthyl ether...	270.11	81	264^{15}		
5502	$C_{20}H_{14}O_2$	α-Dinaphthol....... . .	286.11	300			
5503	$C_{20}H_{14}O_2$	β-Dinaphthol	286.11	218			
5504	$C_{20}H_{14}O_4$	Phenolphthalein......	318.11	261		1.277^{22}_{4}	

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5505	$C_{20}H_{14}O_5$	Fluorescein	334 11	127			
5506	$C_{20}H_{14}O_9$	Psoromic acid	398 11	264			
5507	$C_{20}H_{14}S$	*α, α′*-Dinaphthyl sulfide $(C_{10}H_7)_2S$	286 17	110	290^{15}		
5508	$C_{20}H_{15}N$	*β, β′*-Dinaphthylamine $(C_{10}H_7)_2NH$.	269.12	172 2	471		
5509	$C_{20}H_{15}NO_4$	Sanguinarine	333.12	213			
5510	$C_{20}H_{15}NO_8$	Berilic acid	397.12	200			
5511	$C_{20}H_{15}N_3$	*p*-Amino-*α*-azonaphthalene	297.14	175			
5512	$C_{20}H_{15}N_3$	Amino-*β*-azonaphthalene	297 14	156			
5513	$C_{20}H_{16}N_2$	*α, α′*-Hydrazonaphthalene	284 14	*α* 271; *β* 274			
5514	$C_{20}H_{16}N_2$	*β, β′*-Hydrazonaphthalene	284 14	164			
5515	$C_{20}H_{16}N_2O$	Benzilphenylhydrazone	300.14	134			
5516	$C_{20}H_{16}N_4$	Nitron	312 16	189 d.			
5517	$C_{20}H_{16}O_2$	Triphenylacetic acid $(C_6H_5)_3C.CO_2H$	288 12	265			
5518	$C_{20}H_{16}O_3$	Rosolic acid	304 12	270	d.		
5519	$C_{20}H_{17}N_5O_2$	Rubazonic acid	359 17	181			
5520	$C_{20}H_{18}$	Diphenyl-*m*-tolylmethane	258 14	61 5	356	1 07^{16}	
5521	$C_{20}H_{18}$	1, 1, 2-Triphenylethane	258 14	54	349 4		
5522	$C_{20}H_{18}ClNO_4$	Berberine hydrochloride	371 61			1 397	1333
5523	$C_{20}H_{18}N_2O$	*α*-Benzoinphenylhydrazone	302 16	155			
5524	$C_{20}H_{18}N_2O$	*β*-Benzoinphenylhydrazone	302 16	106			
5525	$C_{20}H_{18}N_4S$	Triphenylguanylthiourea	346 24	157			
5526	$C_{20}H_{19}N$	Dibenzylaniline $C_6H_5N(CH_2C_6H_5)_2$.	273 15	70			
5527	$C_{20}H_{19}NO_5$	Chelidonine	353 15	136			
5528	$C_{20}H_{19}NO_5$	Papaveraldine	353 15	210			
5529	$C_{20}H_{19}NO_5$	Protopine	353 15	207			
5530	$C_{20}H_{19}NO_9$	Berberilic acid	417 15	182			
5532	$C_{20}H_{20}N_2O_5$	Antipyrine acetylsalicylate	368 17	65			
5533	$C_{20}H_{20}O_5$	Cubebinol	340 15	92			
5534	$C_{20}H_{20}O_6$	Cubebin	356 15	132			
5535	$C_{20}H_{20}O_7$	Coccelic acid	372 15	178			
5536	$C_{20}H_{20}O_{10}$	Scoparin	420 15	219 d.			
5537	$C_{20}H_{20}O_{12}$	Luteic acid	452.15	274			
5538	$C_{20}H_{21}NO_3$	Galipeine	323.17	115			
5539	$C_{20}H_{21}NO_4$	*l*-Canadine	339.17	134			
5540	$C_{20}H_{21}NO_4$	Dicentrine	339 17	169			
5541	$C_{20}H_{21}NO_4$	Papaverine	339 17	147	d.	1 337	1331
5542	$C_{20}H_{21}NO_4$	*dl*-Canadine	339 17	167			
5544	$C_{20}H_{22}ClNO_4$	Papaverine hydrochloride	375 64	221 d.			
5545	$C_{20}H_{22}N_2O$	Quinene	306.19	82			
5546	$C_{20}H_{22}N_2O_2$	Dehydroquinine	322 19	181			
5547	$C_{20}H_{22}N_2O_2$	Jelsemine	322.19	178			
5548	$C_{20}H_{22}N_2O_4$	Lysuric acid	354 19	145			
5549	$C_{20}H_{22}O_8$	Populin	390 17	180			
5550	$C_{20}H_{23}ClN_2O_2$	Jelsemine hydrochloride	358 65	300			
5551	$C_{20}H_{23}NO_4$	Acetylcodeine	341.19	133.5			
5552	$C_{20}H_{23}NO_4$	Corypalmine	341.19	236			
5553	$C_{20}H_{23}N_3O_4$	Pyramidon salicylate	369 20	70			
5554	$C_{20}H_{23}O_4$	Naphthyl acid camphorate	327.18	122			
5555	$C_{20}H_{24}Cl_2N_2O_2$	Quinene dichloride	395.12	97			
5556	$C_{20}H_{24}NO_4$	Staphisagroine	342 19	275			
5557	$C_{20}H_{24}N_2O$	Desoxyquinine	308 20	52			
5558	$C_{20}H_{24}N_2O_2$	Isoconquinine	324.20	142			
5559	$C_{20}H_{24}N_2O_2$	Isoquinine	324.20	185			
5560	$C_{20}H_{24}N_2O_2$	Quinicine	324 20	60			
5561	$C_{20}H_{24}N_2O_2$	Quinidine	324.20	168			1298
5562	$C_{20}H_{24}N_2O_2$	Quinine	324.20	175			1279
5563	$C_{20}H_{24}N_2O_2$	Quinine (isomer A)	324.20	193 5			
5564	$C_{20}H_{24}N_2O_2$	Quinine (isomer B)	324.20	189			
5566	$C_{20}H_{25}BrN_2O_2$	Quinine hydrobromide	405.13	200			
5567	$C_{20}H_{25}ClN_2O_2$	Quinidine hydrochloride	360.67	259 d.			
5568	$C_{20}H_{25}ClN_2O_2$	Quinine hydrochloride	360.67	160	259 d.		
5570	$C_{20}H_{25}NO_3$	Lobelidine	311.20	106			
5571	$C_{20}H_{25}NO_4$	Codamine	343.20	121			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5572	$C_{20}H_{25}NO_4$	Laudanidine	343 20	177			
5573	$C_{20}H_{25}NO_4$	Laudanine .	343 20	164 5		1 256	
5575	$C_{20}H_{26}N_2O_6S$	Quinine disulfate	422 28	160 d.			
5577	$C_{20}H_{26}N_2O_2$	Hydroquinidine.	326 22	167			
5578	$C_{20}H_{26}N_2O_2$	Hydroquinine .	326 22	172 3			
5579	$C_{20}H_{27}NO_5$	Diversine	361 22	93			
5580	$C_{20}H_{27}NO_{11}$	Amygdalin	457 22	200			
5581	$C_{20}H_{27}N_2O_4P$	Quinine hypophosphite	390 25	181			
5583	$C_{20}H_{28}O_4$	Thymyl acid camphorate	332 22	89			
5584	$C_{20}H_{28}O_5$	Eugenol acid camphorate	318 22	116			
5585	$C_{20}H_{28}O_6$	Cholanic acid ...	364 22	285			
5586	$C_{20}H_{28}O_{13}$	Primeverin .	476 22	206			
5587	$C_{20}H_{30}N_2O_5$	Quinine hydrate	378 25	57	d.		
5588	$C_{20}H_{30}O_2$	*d*-Pimaric acid	302 23	212	282^{20}		
5589	$C_{20}H_{30}O_4$	Onoceric acid	334 23	120			
5590	$C_{20}H_{30}O_5$	Andrographolide	350 23	218			
5591	$C_{20}H_{32}O_6$	Andrographolic acid	368 25	188			
5592	$C_{20}H_{33}NO$	Myristic anilide	303 26	84			
5593	$C_{20}H_{33}N_3$	Ormosine	315 28	87			
5594	$C_{20}H_{33}N_3$	Ormosinine	315 28	205			
5595	$C_{20}H_{34}O$	Ambrosterol	290 26	147			
5596	$C_{20}H_{34}O$	Cinchol	290 26	139			
5597	$C_{20}H_{34}O$	Cupreol	290 26	140			
5598	$C_{20}H_{34}O$	Quebrachol	290 26	125			
5599	$C_{20}H_{34}O_{10}$	Cyclamin	434 26	236			1333
5600	$C_{20}H_{36}N_8O_{15}$	Vicine .	628 34	242 d.			
5601	$C_{20}H_{36}O$	Excretin	292 28	96			
5602	$C_{20}H_{36}O_2$	Eicosinic acid	308 28	69	270^{15}		
5603	$C_{20}H_{36}O_2$	Ethyl chaulmoograte	308 28		230^{20}	0 906	1036
5604	$C_{20}H_{38}O_2$	Eicosenic acid	310 29	50	267^{15}		
5605	$C_{20}H_{38}O_3$	Ethyl ricinoleate	326 29		258^{13}	0 914	481
5606	$C_{20}H_{40}O$	Phytol.	296 31		204^{10}	0 856	484
5607	$C_{20}H_{40}O_2$	Arachidic acid	312 31	77	328		
5608	$C_{20}H_{40}O_2$	Ethyl stearate $C_{17}H_{35}CO_2C_2H_5$	312 31	33 7	224		
5609	$C_{20}H_{41}I$	*n*-Eicosyl iodide .	408 25	42	$192^{0.5}$		
5610	$C_{20}H_{42}$	*n*-Eicosane $CH_3(CH_2)_{18}CH_3$	282 32	38	205^{15}	$0\ 778_4^{36.7}$	1065
5611	$C_{20}H_{42}O$	Eicosyl alcohol $CH_3(CH_2)_{18}CH_2OH$	298 32	71	220^{3}		
5612	$C_{21}H_{14}O$	α, β′-Dinaphthyl ketone	282 11	135			
5613	$C_{21}H_{14}O$	β, β′-Dinaphthyl ketone	282 11	a 125 5 b 164 5			
5614	$C_{21}H_{14}O_2$	Picenic acid. .	298 11	201			
5615	$C_{21}H_{15}Bi_2O_9$	Bismuth salicylate	829 12	135 d.			
5616	$C_{21}H_{16}$	α, α′-Dinaphthylmethane	268 12	109	360		
5617	$C_{21}H_{16}$	α, β′-Dinaphthylmethane $(C_{10}H_7)_2CH_2$.	268.12	95			
5618	$C_{21}H_{16}$	β, β′-Dinaphthylmethane $(C_{10}H_7)_2CH_2$.	268 12	93			
5619	$C_{21}H_{16}N_2$	Lophine	296 14	275			
5620	$C_{21}H_{16}O_{11}$	Methylenecitrylsalicylic acid	444 12	154			
5621	$C_{21}H_{18}N_2$	Amarin .	298 16	129			
5622	$C_{21}H_{18}N_2$	Hydrobenzamide	298.16	101			
5623	$C_{21}H_{18}O_{12}$	Scutellarin	462.14	200 d.			
5624	$C_{21}H_{19}NO_4$	Fumarine .	349.15	199			
5625	$C_{21}H_{20}$	Phenylditolylmethane	272 15	56			
5626	$C_{21}H_{20}N_2O_4$	Alstonine (Chlorogenine)	364.17	195			
5627	$C_{21}H_{20}O_6$	Curcumin	368.15	183			1333
5628	$C_{21}H_{20}O_9$	Aloin......	416.15	147 9			
5629	$C_{21}H_{20}O_9$	1, 2-Dihydro-3, 5-dihydroxy-4-(α, 3, 4-trihydroxybenzylbenzofuran)*	416.15	217			
5630	$C_{21}H_{20}O_9$	Frangulin. .	416.15	226			
5631	$C_{21}H_{20}O_{11}$	Quercitrin	448.15	185			
5632	$C_{21}H_{20}O_{12}$	Incarnatrin . . .	464.15	245			
5633	$C_{21}H_{21}N$	Tribenzylamine $(C_6H_5CH_2)_3N$	287.17	92		0.991_4^{25}	
5634	$C_{21}H_{21}NO_5$	*d*-Corycavamine	367 17	149			
5635	$C_{21}H_{21}NO_6$	Hydrastine	383.17	132			

* Also commonly known as Catechol, Pyrocatechol, Catechin, Pyrocatechin. See #1414.

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5636	$C_{21}H_{21}NO_6$	Rhoeadine	383.17	232 d.			
5637	$C_{21}H_{21}N_3$	Anhydroformaldehydeaniline	315 19	45.5	185		
5638	$C_{21}H_{21}O_4P$	Tri-*p*-cresyl phosphate	368 19	77			
5639	$C_{21}H_{21}O_6P$	Triguaiacyl phosphite	400.19	78			
5640	$C_{21}H_{21}O_7P$	Triguaiacyl phosphate	416 19	98			
5641	$C_{21}H_{22}N_2O_2$	Isostrychnine	334 19	214 5			
5642	$C_{21}H_{22}N_2O_2$	Strychnine	334 19	268	270^{5}	$1\ 359^{18}$	
5645	$C_{21}H_{22}Cl_2N_2O_2$	Benzamide hydrochloride	436 12	178			
5646	$C_{21}H_{23}NO_4$	Meconidine	353 19	58			
5647	$C_{21}H_{23}NO_5$	Cryptopine	369 19	218		1 351	
5648	$C_{21}H_{23}NO_5$	Diacetylmorphine	369 19	172			1260
5649	$C_{21}H_{23}NO_5$	α-Homochelidonine	369 19	182			
5650	$C_{21}H_{23}NO_5$	β-Homochelidonine	369 19	159			
5651	$C_{21}H_{23}NO_5$	γ-Homochelidonine	369.19	171			
5652	$C_{21}H_{23}NO_6$	Colchiceine	385 19	172			
5653	$C_{21}H_{23}N_3O_5$	Strychine nitrate	397 20				1333
5654	$C_{21}H_{24}ClNO_4$	Diacetylmorphine hydrochloride	405 65	230			
5655	$C_{21}H_{24}N_2O$	Paytine	320 20	156			
5656	$C_{21}H_{24}N_2O$	Strychnidine	320 20	250 5	295^{14}		
5657	$C_{21}H_{24}N_6O_{10}$	Geneserine picrate	520 23	175			
5658	$C_{21}H_{24}O_9$	Glycyphylline	420 19	180			
5659	$C_{21}H_{24}O_{10}$	Phloridzin	436 19	170 d.		1 430	
5660	$C_{21}H_{24}O_{11}$	Datiscin	452 19	180			
5661	$C_{21}H_{24}O_{12}$	Saponarin	468 19	232			
5663	$C_{21}H_{25}NO_4$	Corybulbine.	355 20	239			
5664	$C_{21}H_{25}NO_4$	Corydine	355 20	105			1165
5665	$C_{21}H_{25}NO_4$	Glaucine	355 20	120			
5666	$C_{21}H_{25}NO_4$	Isocorybulbine	355 20	180			
5667	$C_{21}H_{25}N_3O_2$	Porphyrine	351 22	97			
5668	$C_{21}H_{26}N_2O$	Desoxystrychnine	322 22	172			
5669	$C_{21}H_{26}N_2O_3$	Corynanthine	354 22	242			
5670	$C_{21}H_{26}N_2O_3$	Quebrachine	354 22	248			1333
5671	$C_{21}H_{26}N_2O_4$	Quinine formate	370 22	113			
5672	$C_{21}H_{27}ClN_2O_3$	Quebrachine hydrochloride	390 68	290			
5673	$C_{21}H_{27}NO_4$	*d*(*l*)-Laudanosine	357 22	89			
5674	$C_{21}H_{27}NO_{10}$	*d*-Cocaine bitartrate	453 22	112			
5675	$C_{21}H_{28}N_2O$	Tetraethyldiaminobenzophenone	324 23	96			
5676	$C_{21}H_{28}O_4$	Marrubiin	344 22	154.5	297^{15}		
5677	$C_{21}H_{30}N_2O_4$	Struxine	374 25	250 d.			
5678	$C_{21}H_{30}O_2$	Cannabinol	314 23		315^{100}	$1\ 042^{18}$	
5679	$C_{21}H_{30}O_4$	Euonymol	346 23	250			
5680	$C_{21}H_{30}O_8$	Antiarin	410 23	215			
5681	$C_{21}H_{34}O$	Pyrethrol	302 27	199	290		
5682	$C_{21}H_{34}O_2$	Benzyl myristate $C_{13}H_{27}CO_2CH_2C_6H_5$	318 26	20 5	231^{11}	$0\ 932^{25}_{25}$	536
5683	$C_{21}H_{34}O_3$	Di-*d*-bornyl carbonate	334.26	216			
5684	$C_{21}H_{34}O_4$	Ipurganol	350 26	225			
5685	$C_{21}H_{34}O_{10}$	Helleborein	446.26	230 d.			
5686	$C_{21}H_{36}O_4$	Trifolianol	352 28	300			
5687	$C_{21}H_{38}O_3$	Di-*l*-menthyl carbonate	338 29	106			
5688	$C_{21}H_{38}O_6$	Tricaproin	386 29	−25		0 988	392
5689	$C_{21}H_{40}O_2$	Dimentholformal	324 31	57	337		
5690	$C_{21}H_{42}$	9-Heneicosene $C_9H_{17}CH:CHC_{11}H_{23}$	294 32	3	202^{11}	0.805^{15}	
5691	$C_{21}H_{42}O_2$	Cluytinic acid	326 32	69			
5692	$C_{21}H_{42}O_2$	Heneicosonic acid $CH_3(CH_2)_{19}CO_2H$	326 32	74			
5693	$C_{21}H_{43}NO$	Heneicosamide $CH_3(CH_2)_{19}CONH_2$	325 34	110			
5694	$C_{21}H_{44}$	*n*-Heneicosane $CH_3(CH_2)_{19}CH_3$	296.34	40 4	215^{15}	$0.775^{45.3}_{4}$	1067
5695	$C_{22}H_{14}$	Picene	278 11	364	520		
5696	$C_{22}H_{14}N_2O$	Rosindon (Rosindulon)	322.12	262			
5697	$C_{22}H_{15}NO_6$	Colchinine	389.12	146			
5698	$C_{22}H_{15}N_3$	Rosinduline	321.14	199			
5699	$C_{22}H_{18}O_4$	*o*-Cresolphthalein	346.14	216			
5700	$C_{22}H_{20}O_{13}$	Carminic acid	492 15	136 d.			
5701	$C_{22}H_{22}O_{11}$	Isotrifolin	462.17	250			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5702	$C_{22}H_{22}O_{11}$	Trifolin	462.17	260			
5703	$C_{22}H_{23}NO_7$	Gnoscopine	413.19	233			
5704	$C_{22}H_{23}NO_7$	Narcotine.	413.19	175		1.374	
5705	$C_{22}H_{13}N_3O_7$	Pyrene picrate	431.12	218			
5706	$C_{22}H_{24}O_{10}$	Sakuranin .	448.19	212			
5707	$C_{22}H_{25}NO_4$	Corycavidine .	367.20	213			
5708	$C_{22}H_{25}NO_6$	*l*-Colchicine...	399.20	146			1333
5709	$C_{22}H_{26}N_2O_2$	Apoyohimbine	350.22	252			
5710	$C_{22}H_{26}N_2O_3$	Acetylquinine	366.22	108			
5711	$C_{22}H_{26}N_2O_3$	Gelsemine .	366.22	178			
5712	$C_{22}H_{26}N_2O_4$	Chaimaridine	382.22	128			
5713	$C_{22}H_{26}N_2O_4$	Chaimarine	382.22	233			
5714	$C_{22}H_{26}N_2O_4$	Conchamarine	382.22	120			
5715	$C_{22}H_{26}N_2O_4$	Conchairamidine	382.22	115			
5716	$C_{22}H_{26}N_2O_4$	Mitraversine	382.22	237			
5718	$C_{22}H_{26}O_{12}$	Hesperidin	482.20	171	251 d.		
5719	$C_{22}H_{27}AsNO_6$	Strychnine methylarsinate	460.18	60 d			
5720	$C_{22}H_{27}BrN_2O_3$	Gelsemmine hydrobromide	447.14				1333
5721	$C_{22}H_{27}ClN_2O_2$	Apoyohimbine hydrochloride	386.68	300			
5722	$C_{22}H_{27}ClN_2O_3$	Gelseminine hydrochloride	402.68	330			1333
5723	$C_{22}H_{27}NO_4$	*dl*-Corydaline . .	369.22	136			
5724	$C_{22}H_{27}N_3O_5$	Physostigmine salicylate	413.23	178.9			1333
5725	$C_{22}H_{28}N_2O_2$	Aspidosamine	352.23	100			
5726	$C_{22}H_{28}N_2O_2$	Aspidospermatine	352.23	162			
5727	$C_{22}H_{28}N_2O_4$	Ditaine (Echitamine)	384.23	206			1333
5728	$C_{22}H_{28}N_2O_4$	Quinine acetate . .	384.23	126			
5729	$C_{22}H_{28}N_4$	Camphorosazone	348.25	55			
5730	$C_{22}H_{28}O_3$	Santalyl salicylate . .	340.22		126.6^{20}	1.070^{15}	
5732	$C_{22}H_{29}IO_2$	Europhen (Diisobutyl-*p*-cresol iodide)	452.16	110			
5733	$C_{22}H_{30}N_2O_2$	Aspidospermine	354.25	208	220^2		
5734	$C_{22}H_{31}NO_5$ (?)	Mitragynine .	389.25	106	240^5		
5735	$C_{22}H_{32}O_3$	Anacardic acid	344.25	26			
5736	$C_{22}H_{32}O_4$	Digitoxigenin . .	360.25	230			
5737	$C_{22}H_{32}O_6$	Genin	392.25	206			
5738	$C_{22}H_{33}NO_5$	Atropine isovalerate	391.26	32			
5739	$C_{22}H_{33}NO_5$	Atropine valerate	391.26	42			1333
5741	$C_{22}H_{34}N_4O_8S$	Pilocarpine sulfate	514.36	132			1333
5742	$C_{22}H_{35}NO_6$	Delphinine .	409.28	187.5			
5743	$C_{22}H_{36}O_4$	Bryonol . . .	364.28	212			
5744	$C_{22}H_{36}O_8$	Capsularin. . . .	428.28	176			
5745	$C_{22}H_{37}NO$	Palmitic anilide	331.29	90.5	284^{17}		
5746	$C_{22}H_{38}O$	Cholestol.	318.29	139	360		
5747	$C_{22}H_{38}O$	Ilicyl alcohol	318.29	175	350		
5748	$C_{22}H_{38}O_4$	Citrullol. .	366.29	290			
5759	$C_{22}H_{38}O_4$	Di-*l*-menthyl oxalate	366.29	68	225^{12}		
5760	$C_{22}H_{39}ClO$	Behenolyl chloride $C_{21}H_{39}COCl$	354.76	29			
5761	$C_{22}H_{40}O_2$	Behenolic acid $C_{21}H_{39}CO_2H$	336.31	57.5			
5762	$C_{22}H_{41}NO$	Behenolyl amide $C_{21}H_{39}CONH_2$	335.32	90			
5763	$C_{22}H_{42}O_2$	Brassidic acid	338.32	61.5	282^{30}	$0.859^{57.1}$	1085
5764	$C_{22}H_{42}O_2$	Erucic acid	338.32	33.5	281^{30}	$0.860_4^{55.4}$	
5765	$C_{22}H_{42}O_3$	14-Ketobehenic acid	354.32	84			
5765.1	$C_{22}H_{42}O_3$	Isobutyl ricinoleate	354.32		262^9	0.903^{22}	980
5766	$C_{22}H_{43}NO$	Erucamide $C_{21}H_{41}CONH_2$	337.34	83			
5767	$C_{22}H_{44}O$	Erucyl alcohol. .	324.34	34.6	$200^{0.2}$		
5768	$C_{22}H_{44}O_2$	Behenic acid . .	340.34	84	306^{60}		
5769	$C_{22}H_{44}O_2$	Methyl heneicosate $C_{20}H_{41}CO_2CH_3$	340.34	49			
5770	$C_{22}H_{45}I$	Docosyl iodide $CH_3(CH_2)_{20}CH_2I$	436.28	49			
5771	$C_{22}H_{45}NO$	Behenamide $C_{21}H_{43}CONH_2$.	339.36	112			
5772	$C_{22}H_{46}$	*n*-Docosane $CH_3(CH_2)_{20}CH_3$	310.35	44.4	224.5^{15}	$0.778_4^{44.4}$	
5773	$C_{22}H_{46}O$	Docosyl alcohol $CH_3(CH_2)_{20}CH_2OH$.	326.35	74			
5774	$C_{23}H_{20}O_3$	Amaric anhydride	328.15	140.5			
5775	$C_{23}H_{23}NO_6$	Corycavine.	409.19	216			
5776	$C_{23}H_{24}N_2O_6$	Buphnatine.	424.20	240			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R I. No.
5777	$C_{23}H_{24}N_4O_2$	Methylenediantipyrine	388.22	177			
5778	$C_{23}H_{24}N_4O_{11}$	Hyoscine picrate	532.22	188			
5779	$C_{23}H_{24}O_3$	*o*-Cresol orthoacetate	348.19	89			
5780	$C_{23}H_{24}O_9$	Picropodophyllin	444.19	227			
5781	$C_{23}H_{24}O_9$	Podophyllotoxin	444.19	94			
5782	$C_{23}H_{25}NO_4$	Lanthopine	379.20	200			
5783	$C_{23}H_{26}ClN_3O_3$	Acoin . .	427.68	178			
5784	$C_{23}H_{26}N_2O_4$	Aricine	394.22	188 d.			
5785	$C_{23}H_{26}N_2O_4$	Brucine	394.22	178			
5786	$C_{23}H_{26}N_2O_4$	Coneusconine	394.22	208			
5787	$C_{23}H_{26}N_2O_4$	Cusconine	394.22	110			
5788	$C_{23}H_{26}N_2O_5$	Allobrucine oxide	410.22	189			
5789	$C_{23}H_{27}NO_6$	Homoatropine salicylate	413.22				1333
5790	$C_{23}H_{27}NO_8$	Narceine . . .	445.22	170			
5791	$C_{23}H_{27}N_3O_7$	Brucine nitrate	457.23	230 d.			
5792	$C_{23}H_{28}ClNO_8$	Narceine hydrochloride	481.68	192			1333
5793	$C_{23}H_{28}N_2O_4$	Vellosine .	396.23	189 d.			
5794	$C_{23}H_{29}NO_2$	Lobeline	351.23	131			
5795	$C_{23}H_{30}N_2O_4$	Quinine propionate	398.25	111			
5796	$C_{23}H_{30}N_2O_5$	*dl*-Quinine lactate .	414.25	165.5			
5797	$C_{23}H_{30}N_2O_5$	*d*-Quinine lactate	414.25	175			
5798	$C_{23}H_{30}N_2O_5$	*l*-Quinine lactate	414.25	171			
5799	$C_{23}H_{31}NO_2$	Atisine .	353.25	85			
5801	$C_{23}H_{32}N_2O_4$	Quinine ethyl carbonate (Equinine).	401.27	91			
5802	$C_{23}H_{33}N_3O_5$	Pyramidon acid camphorate .	431.28	94			
5803	$C_{23}H_{36}O_2$	Lactucon (Lactucol acetate)	344.28	184			
5804	$C_{23}H_{36}O_4$	Calabarol	376.28	245			
5804.1	$C_{23}H_{38}N_2$	Conessine	342.31	125			1333
5805	$C_{23}H_{38}O_2$	Benzyl palmitate	346.29	36		0.914_{25}^{38}	1079
5806	$C_{23}H_{38}O_4$	Anonol	378.29	298			
5807	$C_{23}H_{38}O_4$	Grindelol (Phytosterol glucoside)	378.29	257			
5808	$C_{23}H_{40}O$	Ambrein	332.31	82			
5809	$C_{23}H_{40}O$	Xanthosterin	332.31	214			
5810	$C_{23}H_{40}O_4$	Di-*l*-menthyl malonate	380.31	62	170^1	0.944_4^{76}	
5811	$C_{23}H_{40}O_4$	Ipuranol	380.31	290			
5812	$C_{23}H_{42}O_2$	Methyl behenolate $C_{21}H_{39}CO_2CH_3$	350.32	22			
5813	$C_{23}H_{44}O_2$	Methyl erucate $C_{21}H_{41}CO_2CH_3$	352.34		222^5	0.870	457
5814	$C_{23}H_{46}O$	Laurone $(C_{11}H_{23})_2CO$	338.35	69		$0.789_4^{90.9}$	1111
5815	$C_{23}H_{46}O_2$	Methyl behenate $C_{21}H_{43}CO_2CH_3$	354.35	54.5	225		
5816	$C_{23}H_{48}$	*n*-Tricosane $CH_3(CH_2)_{21}CH_3$. . .	324.37	47.7	320.7	$0.779_4^{47.7}$	1120
5817	$C_{24}H_{18}$	Crackene	306.14	308	500		
5818	$C_{24}H_{18}$	1, 3, 5-Triphenylbenzene	306.14	170		1.206	1317
5819	$C_{24}H_{18}As_2N_2O$	Phenarsazine oxide	500.08	350			
5820	$C_{24}H_{18}N_2$	*p*, *p*′-Diphenylazobenzene	334.16	250			
5821	$C_{24}H_{18}N_2O$	*p*, *p*′-Diphenylazoxybenzene	350.16	205			
5822	$C_{24}H_{20}N_2$	*p*, *p*′-Diphenylhydrazobenzene	336.17	247			
5823	$C_{24}H_{20}O_6$	Glycerol tribenzoate	404.15	76.5			
5824	$C_{24}H_{20}O_9$	Glycerol trisalicylate	452.15	79			
5826	$C_{24}H_{25}N_3O$	Benzoylauramine	371.22	179			
5829	$C_{24}H_{28}O_6$	Diguaiacyl camphorate	412.22	124			
5830	$C_{24}H_{28}O_8$	*α*-Flavaspidic acid	444.22	92			
5831	$C_{24}H_{28}O_8$	*β*-Flavaspidic acid	444.22	156			
5832	$C_{24}H_{29}NO_6$	Atropine salicylate	427.23				1333
5834	$C_{24}H_{30}O_5$	Elaterone	398.23	300			
5835	$C_{24}H_{30}O_7$	Anthamantin	430.23	79			
5836	$C_{24}H_{30}O_{15}$	Scopolin .	558.23	218			
5837	$C_{24}H_{32}N_2O_4$	Quinine butyrate	412.26	77.5			
5838	$C_{24}H_{32}N_4O_9$	Maltosazone	520.28	206			
5839	$C_{24}H_{38}N_2O$	Holarrhenine	370.31	198			
5840	$C_{24}H_{38}O_4$	Di-*d*-bornyl succinate	390.29	83.7			
5841	$C_{24}H_{40}N_2$	Conessine	356.32	125			
5842	$C_{24}H_{40}O_4$	Choleic acid	392.31	190			
5843	$C_{24}H_{40}O_4$	Cucurbitol	392.31	260			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No.
5844	$C_{24}H_{40}O_5$	Cholic acid	408.31	195			
5845	$C_{24}H_{41}NO$	Stearic anilide $CH_3(CH_2)_{16}CONHC_6H_5$	359.32	93.6			
5846	$C_{24}H_{42}O_4$	Di-*l*-menthyl succinate	394.32	63	220 d	0.947^{21}_{4}	
5847	$C_{24}H_{42}O_6$	Di-*l*-menthyl *d*-tartrate	426.32	75		1.054	
5848	$C_{24}H_{42}O_6$	Di-*l*-menthyl *l*-tartrate	426.32	42		1.045^{16}	
5849	$C_{24}H_{44}O_5$	Lithofellinic acid	412.34	206			
5850	$C_{24}H_{44}I_2O_2$	Ethyl diiodobrassidate	618.20	37			
5851	$C_{24}H_{44}O_2$	Ethyl behenolate $C_{21}H_{39}CO_2C_2H_5$	364.34	15			
5852	$C_{24}H_{46}O_2$	Ethyl brassidate	366.35	30.5			1046
5853	$C_{24}H_{46}O_2$	Ethyl erucate $C_{21}H_{41}CO_2C_2H_5$	366.35		230	0.865	449
5854	$C_{24}H_{48}O_2$	Carnaubic acid	368.37	72			
5855	$C_{24}H_{48}O_2$	Lignoceric acid $C_{23}H_{47}CO_2H$	368.37	81			
5856	$C_{24}H_{48}O_2$	Paraffinic acid $C_{23}H_{47}CO_2H$	368.37	46			
5857	$C_{24}H_{48}O_2$	Pisangcerylic acid $C_{23}H_{47}CO_2H$	368.37	72			
5858	$C_{24}H_{48}O_2$	Tetraconic acid $CH_3(CH_2)_{22}CO_2H$	368.37	85.5			
5859	$C_{24}H_{48}O_2$	Ethyl behenate $C_{21}H_{43}CO_2C_2H_5$	368.37	50.5	231		
5860	$C_{24}H_{50}$	Isotetracosane	338.39	51	243^{15}		
5861	$C_{24}H_{50}$	*n*-Tetracosane $CH_3(CH_2)_{22}CH_3$	338.39	51	324.1	$0.779^{51.1}_{4}$	
5862	$C_{24}H_{50}O$	Carnaubyl alcohol $C_{24}H_{49}OH$	354.39	69			
5863	$C_{25}H_{20}$	Tetraphenylmethane $C(C_6H_5)_4$	320.15	285	431		
5864	$C_{25}H_{21}N_3$	Tetraphenylguanidine	363.19	131			
5865	$C_{25}H_{26}O_{11}$	Ononin	502.20	210			
5866	$C_{25}H_{28}O_{14}$	Gentiin	552.22	274			
5867	$C_{25}H_{29}NO_8S$	Codeine *o*-guaiacolsulfonate	503.30	165			
5868	$C_{25}H_{32}O_8$	Albaspidin	460.25	147			
5869	$C_{25}H_{32}O_8$	Aspidin	460.25	124			
5871	$C_{25}H_{34}O_{14}$	Loganin	558.26	215			
5872	$C_{25}H_{39}NO_8$	Pseudoaconine	481.31	95			
5873	$C_{25}H_{40}O$	Fungisterin	356.31	144			
5874	$C_{25}H_{40}O$	Homotaraxasterol	356.31	164			
5875	$C_{25}H_{40}O_2$	Benzyl oleate	372.31		237^7	0.933^{25}_{25}	1024
5876	$C_{25}H_{42}O_2$	Benzyl stearate $C_{17}H_{35}CO_2CH_2C_6H_5$	374.32	45.8		0.908^{50}_{25}	1078
5877	$C_{25}H_{44}O_4$	Di-*l*-menthyl glutarate	408.34		243^{20}		
5878	$C_{25}H_{50}O_2$	Neocerotic acid	382.39	77.8			
5879	$C_{25}H_{50}O_2$	Hyenic acid.	382.39	78			
5880	$C_{25}H_{50}O_3$	Cerebronic acid	398.39	100			
5881	$C_{25}H_{52}$	Pentacosane $CH_3(CH_2)_{23}CH_3$	352.40	54	284^{40}	0.779	
5882	$C_{26}H_{14}$	Rubicene	326.11	306			
5883	$C_{26}H_{20}$	Tetraphenylethylene	332.15	221	425		
5884	$C_{26}H_{20}O$	α-Benzopinacoline	348.15	205			
5885	$C_{26}H_{20}O$	β-Benzopinacoline	348.15	181			
5886	$C_{26}H_{21}NO_{11}$	Aconine	523.17	132			
5887	$C_{26}H_{22}$	1, 1, 2, 2-Tetraphenylethane	334.17	209	383	1.182	
5888	$C_{26}H_{22}N_4$	Benzilosazone	390.20	225			
5889	$C_{26}H_{22}O_2$	Benzopinacone	366.17	186 d.			
5890	$C_{26}H_{23}N_5$	Tetraphenyldiguanidine	405.22	136			
5891	$C_{26}H_{26}N_2O_2$	Benzoylcinchonine	398.22	106			
5892	$C_{26}H_{27}ClN_2O_2$	Benzoylcinchonine hydrochloride	434.68	207			
5893	$C_{26}H_{28}N_2O_4$	Cinchonidine salicylate	432.23	70			
5895	$C_{26}H_{28}O_{14}$	Ruberythric acid	564.22	260			
5896	$C_{26}H_{28}O_{14}$	Morindin	564.22	245	247		
5897	$C_{26}H_{30}N_2O_6S$	Quinine phenolsulfonate	498.31				1333
5898	$C_{26}H_{30}O_4$	Bixin	406.23	189			
5899	$C_{26}H_{32}N_2O_2$	Ibogine	404.26	152			
5900	$C_{26}H_{37}NO_3$	Jervine	411.29	241			
5901	$C_{26}H_{38}$	Carotin	350.29	167.8			
5902	$C_{26}H_{40}O$	Ergosterin	368.31	154	185^{20}	1.040	
5903	$C_{26}H_{40}O_7$	Laserpitin	464.31	117.5	240^{10} d.		
5904	$C_{26}H_{41}NO_{10}$	Japaconine	527.32	97			
5905	$C_{26}H_{42}O_3$	Sarsasapogenin	402.32	183			
5906	$C_{26}H_{42}O_3$	Smilacin	402.32	160 d.			
5907	$C_{26}H_{43}NO_2$	Rubijervine	401.34	236			
5908	$C_{26}H_{43}NO_6$	Glycocholic acid	465.34	134			

No	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. I. No
5909	$C_{28}H_{44}O$	*Caulosterol*	*372.34*	159			
5910	$C_{28}H_{44}O_2$	*Onocerin*	*388.34*	232			
5911	$C_{26}H_{44}O_4$	*Gitogenin*	*420.34*	272			
5912	$C_{26}H_{44}O_{10}$	Parillin	516.34	176.1			
5913	$C_{26}H_{45}NO_8$	Protoveratridine	499.36	265			
5914	$C_{26}H_{46}O$	Mochyl alcohol $C_{26}H_{45}OH$	374.35	234			
5915	$C_{26}H_{46}O_4$	Di-*l*-menthyl adipate	422.35	61			
5916	$C_{26}H_{52}O_2$	Cerotic acid	396.40	82.5		0.836_4^{79}	
5917	$C_{26}H_{52}O_2$	Ethyl lignocerate	396.40	56	310^{20}		
5918	$C_{26}H_{54}$	*n*-Hexacosane $CH_3(CH_2)_{24}CH_3$	366.42	60	296^{40}	0.779	
5919	$C_{26}H_{54}$	Isohexacosane	366.42	61	$207^{0.}$		
5920	$C_{26}H_{54}O$	Ceryl alcohol $C_{26}H_{53}OH$	382.42	80			
5921	$C_{27}H_{28}Br_2N_2O_5$	Quinine dibromosalicylate	620.06	198			
5922	$C_{27}H_{28}N_6S_3$	Diphenylguanidine trithiocarbonate	532.46	89			
5925	$C_{27}H_{30}N_2O_5$	Quinine salicylate	462.25	187			1333
5926	$C_{27}H_{30}O_{15}$	Apiin	594.23	228			
5927	$C_{27}H_{30}O_{16}$	Sophorin	610.23	166			
5928	$C_{27}H_{32}O_{16}$	Rutin	612.25	183	d.		
5929	$C_{27}H_{38}O_7$	Strophantidin	474.29	195			
5930	$C_{27}H_{39}N_5O_5$	Paucine	513.34	126			
5931	$C_{27}H_{40}O_8$	Cerberin	492.31	192			
5932	$C_{27}H_{42}O$	Ergosterin	382.32	165			
5933	$C_{27}H_{46}O$	Cholesterin	386.35	148	> 360	1.067	
5934	$C_{27}H_{46}O$	Phytosterol	386.35	136			
5935	$C_{27}H_{46}O$	Sitosterol	386.35	140			
5936	$C_{27}H_{46}O_2$	Atropurol	402.35	285			
5937	$C_{27}H_{47}N$	Cholesterylamine	385.37	104			
5938	$C_{27}H_{47}NO_9$	Indaconine	529.37	94			
5939	$C_{27}H_{48}O$	Coprosterol	388.37	105			
5940	$C_{27}H_{50}O_6$	Tricaprylin	470.39	8		0.954	425
5941	$C_{27}H_{54}O$	Myristone $(C_{13}H_{27})_2CO$	394.42	76		$0.792_4^{90.9}$	
5942	$C_{27}H_{56}$	*n*-Heptacosane $CH_3(CH_2)_{25}CH_3$	380.43	59.5	270^{15}	$0.779_4^{59.5}$	
5943	$C_{28}H_{18}$	9, 9′-Dianthranyl	354.14	300			
5944	$C_{28}H_{20}N_2$	Amaron (Tetraphenylpyrazine)	384.17	240			
5945	$C_{28}H_{22}N_2O$	Benzoylamarin	402.19	180			
5946	$C_{28}H_{22}O_2$	Anthrapinacone	390.17	182 d.			
5947	$C_{28}H_{24}N_2$	Benzylamarin	388.20	124			
5948	$C_{28}H_{28}N_2O_5$	Strychnine salicylate	472.23				1333
5949	$C_{28}H_{30}O_2$	Columbin . . .	398.23	182			
5950	$C_{28}H_{34}O_{11}$	Phillyrin	546.26	160			
5951	$C_{28}H_{36}N_2O_4$	Ipecamine	464.29	90			
5952	$C_{28}H_{36}N_2O_4$	Psychotrine	464.29	138			
5953	$C_{28}H_{36}O_7$	Digitogenic acid	484.28	210			
5954	$C_{28}H_{38}N_2O_4$	Cephaeline	466.31	99			
5955	$C_{28}H_{38}N_2O_4$	Hydroipecamine	466.31	92			
5956	$C_{28}H_{38}O_7$	α-Elaterin	486.29	232			
5957	$C_{28}H_{38}O_7$	β-Elaterin	486.29	195			
5958	$C_{28}H_{44}O_2$	Lactucerin	412.34	210			
5959	$C_{28}H_{45}NO$	Behenolic anilide $C_{21}H_{39}CONHC_6H_5$.	411.36	72			
5960	$C_{28}H_{46}NO_9$	Isopyroine .	540.36	160			
5961	$C_{28}H_{46}O_2$	Cholesteryl formate	414.35				1216
5962	$C_{28}H_{47}NO$	Brassidic anilide $C_{21}H_{41}CONHC_6H_5$	413.37	78			
5963	$C_{28}H_{47}NO$	Erucic anilide $C_{21}H_{41}CONHC_6H_5$	413.37	66			
5964	$C_{28}H_{48}O_{10}$	Gitalin . .	544.37	253			
5965	$C_{28}H_{49}NO$	Behenic anilide $CH_3(CH_2)_{20}CONHC_6H_5$	415.39	102			
5966	$C_{28}H_{54}O_2$	*l*-Menthyl stearate	422.42	39			
5967	$C_{28}H_{58}$	Octocosane $CH_3(CH_2)_{26}CH_3$	394.45	65	318^{40}	0.779	
5968	$C_{28}H_{58}O$	Cluytyl alcohol	410.45	82.5			
5969	$C_{29}H_{24}O_8$	Fortoin (Methylenedicotoine)	500.19	213			
5970	$C_{29}H_{26}O_{12}$	Aromadendrin . .	566.20	216			
5971	$C_{29}H_{32}N_2O_6$	Quinine acetylsalicylate	504.26	157			
5972	$C_{29}H_{35}NO_7$	Paniculatine . . .	509.28	263			
5973	$C_{29}H_{36}N_2O_4$	Emetamine.	476.29	156			

No.	Formula	Name	Mol wt.	M P	B P.	d	R. I. No.
5974	$C_{29}H_{40}N_2O_4$	Isoemetine.	480.32	98			
5975	$C_{29}H_{42}Cl_2N_2O_4$	Isoemetine hydrochloride	553.26	310 d			
5976	$C_{29}H_{43}NO_7$	Pseudojervine	517.34	307			
5977	$C_{29}H_{43}NO_8$	Sabadenine	533.34	160	197 d		1333
5978	$C_{29}H_{48}$	Spinacene	396.37	< 20	260^{9}	0.859^{20}_{20}	570
5979	$C_{29}H_{48}O$	Taraxasterol	412.37	222			
5980	$C_{29}H_{49}O_3$	Phytosterol acetate	445.38	122			
5981	$C_{29}H_{50}O_5$	Cluytianol	478.39	300			
5982	$C_{29}H_{51}NO_8$	Sabadine	541.40	240			
5983	$C_{29}H_{52}O_{20}$	Sapotin	720.40	240			
5984	$C_{29}H_{58}O_2$	Montanic acid	438.45	86.8			
5985	$C_{29}H_{60}$	Nonacosane $CH_3(CH_2)_{27}CH_3$	408.46	63.6	348^{40}	0.780	
5986	$C_{30}H_{20}NO_9$	Adlumidine	538.16	234			
5987	$C_{30}H_{28}O_{10}$	Santalin	548.22	226	195^{9}		
5989	$C_{30}H_{34}O_{13}$	Picrotoxin..	602.26	200			
5990	$C_{30}H_{38}O_4$	Hellesboresin	462.29	150 d			
5991	$C_{30}H_{40}N_2O_5$	Emetine	508.32	74			
5993	$C_{30}H_{42}Cl_2N_2O_5$	Emetine dihydrochloride	581.26	53			1333
5994	$C_{30}H_{42}I_2N_2O_5$	Emetine dihydroiodide	764.20	238			
5995	$C_{30}H_{42}N_2O_{15}S_2$	Sinalbin	734.17	138.5			
5996	$C_{30}H_{44}N_6O_8S$	Physostigmine sulfate	648.45	140			
5997	$C_{30}H_{44}O_9$	Cymarin	548.34	138 d			
5998	$C_{30}H_{46}O_{12}$	Ouabain	598.35	185			
5999	$C_{30}H_{48}O_2$	Echicerin	440.37	157			
6000	$C_{30}H_{48}O_2$	Mycosterol	440.37	160			
6001	$C_{30}H_{48}O_8$	β-Quinovin	536.37	235			
6002	$C_{30}H_{50}O$	α-Amyrin	426.39	185	> 300		
6003	$C_{30}H_{50}O$	β-Amyrin	426.39	195			
6004	$C_{30}H_{50}O$	Androsterol	426.39	208			
6005	$C_{30}H_{50}O$	Stigmasterol	426.39	140			
6006	$C_{30}H_{50}O_2$	Betulin	442.39	252			
6007	$C_{30}H_{50}O_2$	Cholesterol propionate	442.39	98.7			
6008	$C_{30}H_{52}O_4$	Menthyl camphorate	476.40	86			
6009	$C_{30}H_{54}N_4O_4S$	Sparteine sulfate	566.51				1333
6010	$C_{30}H_{60}$	Melene	420.46	63	380	0.890	
6011	$C_{30}H_{60}O_2$	Melissic acid $CH_3(CH_2)_{28}CO_2H$	452.46	91			
6012	$C_{30}H_{60}O_4$	Lanoceric acid	484.46	105			
6013	$C_{30}H_{62}$	Melissane	422.48	74	$222^{0.4}$		
6014	$C_{30}H_{62}$	n-Triacontane $CH_3(CH_2)_{28}CH_3$	422.48	70	$235^{1.0}$	0.780	
6015	$C_{30}H_{62}O$	Melissyl alcohol	438.48	88		0.777^{95}	
6016	$C_{30}H_{62}O_2$	Cocceryl alcohol	454.48	104			
6017	$C_{31}H_{15}NO_4$	Apomorphine dibenzoate	465.12	156			
6018	$C_{31}H_{26}O_{10}$	Tephrosin	558.20	187			
6019	$C_{31}H_{27}NO_5$	Dibenzoylmorphine	493.22	190.5			
6020	$C_{31}H_{38}O_{10}$	Kosin	570.29	142			1333
6021	$C_{31}H_{43}NO_{11}$	Napelline	603.36	165			
6022	$C_{31}H_{48}O$	Lupeon.	431.33	170			
6023	$C_{31}H_{50}O$	Lupeol	438.39	215			
6024	$C_{31}H_{52}O_2$	Cholesterol butyrate	456.40	92.8			
6025	$C_{31}H_{52}O_2$	Euonysterol	456.40	138			
6026	$C_{31}H_{62}O$	Palmitone $(C_{15}H_{31})_2CO$	450.48	83		$0.795^{90.9}_{4}$	1125
6027	$C_{31}H_{62}O_3$	Cocceric acid ...	482.48	93			
6028	$C_{31}H_{64}$	n-Hentriacontane $CH_3(CH_2)_{29}CH_3$	436.49	68.1	302^{15}	$0.781^{68.1}_{4}$	
6029	$C_{32}H_{22}O_{10}$	Heraclin ..	566.17	185			
6030	$C_{32}H_{26}$	Pentaphenylethane	410.20	173			
6031	$C_{32}H_{27}N_3O$	Benzacine	469.23	150			
6032	$C_{32}H_{41}NO_9$	Pyraconitine .	583.32	171			
6032.1	$C_{32}H_{42}N_2O_9$	Lappaconitine	598.34	223			
6033	$C_{32}H_{44}N_2O_{10}S$	Homoatropine sulfate	648.42				1333
6034	$C_{32}H_{44}O_{10}$	Quassiin	588.34	211			
6035	$C_{32}H_{45}NO_9$	Indobenzaconine. ...	587.36	130			
6036	$C_{32}H_{46}BrNO_{10}$	Benzaconine hydrobromide	684.28	282			
6037	$C_{32}H_{46}ClNO_{10}$	Benzaconine hydrochloride	639.82	α 217; β 208			

No.	Formula	Name	Mol. wt.	M. P.	B. P.	d	R. No
6038	$C_{32}H_{48}N_2O_{14}S$	Sinapine sulfate	716 45	193			
6039	$C_{32}H_{49}NO_9$	Veratrine	591 39	205			
6040	$C_{32}H_{51}NO_{11}$	Protoveratrine	625 40	250			
6041	$C_{32}H_{52}N_2O_3$	Lycopodine	512 42	115			
6042	$C_{32}H_{52}O_2$	Echitin	468 40	170			
6043	$C_{32}H_{54}O_2$	Cholesterol valerate	470 42	89 6			
6044	$C_{32}H_{54}O_2$	Phytosterol valerate	470 42	30			
6045	$C_{32}H_{62}O_3$	Palmitic anhydride $(C_{15}H_{31}CO)_2O$	494 48	64			
6046	$C_{32}H_{62}O_{16}$	Convolvulin (Rhodeoretin)	702 48	158			
6047	$C_{32}H_{64}O_2$	Cetyl palmitate $C_{15}H_{31}CO_2C_{16}H_{33}$	480 49	54		0 832_4^{80}	
6048	$C_{32}H_{66}$	n-Dotriacontane $CH_3(CH_2)_{30}CH_3$	450 51	75	310^{15}	0 $775^{79.4}$	1110
6049	$C_{33}H_{40}O_{19}$	Robinin	740 31	195			
6050	$C_{33}H_{43}NO_{11}$	Anhydroaconitine	629 34	186			
6051	$C_{33}H_{46}N_2O_9$	Septentrionaline	614 37	131			
6052	$C_{33}H_{50}O_{10}$	Tormentol	606 39	228			
6053	$C_{33}H_{53}NO_7$	Solangustine	575 42	235 d.			
6054	$C_{33}H_{56}O_2$	Cholesterol caproinate	484 43	91 2			
6055	$C_{33}H_{56}O_6$	Phytosteroline	548 43	290			
6056	$C_{33}H_{62}O_6$	Tricaprin	554 48	31 1		0 921_4^{40}	1054
6057	$C_{33}H_{66}O_2$	Psyllostearylic acid	494 51	95			
6058	$C_{33}H_{68}O$	Psyllostearyl alcohol	480 52	69 5			
6059	$C_{34}H_{32}O_6$	Isoeugenol dibenzoate	536 25	161			
6060	$C_{34}H_{36}N_2O_6$	Pseudomorphine	568 29	327 d.			
6061	$C_{34}H_{36}N_2O_9$	Sekisanine	616 29	200			
6062	$C_{34}H_{40}N_2O_{10}S$	Morphine sulfate	668 39	250 d.			1333
6063	$C_{34}H_{40}N_2O_{12}S_2$	Quinine diguaiacolsulfonate	732 45	130 d.			
6064	$C_{34}H_{44}N_2O_8S$	Apoatropine sulfate	640 42				1333
6065	$C_{34}H_{44}O_8$	d-Camphor salicylate	580 34	60			
6066	$C_{34}H_{47}NO_{10}$	Indaconitine	629 37	203			
6067	$C_{34}H_{47}NO_{11}$	Aconitine	645 37	195			
6068	$C_{34}H_{48}BrNO_{11}$	Aconitine hydrobromide	726 29	163			1333
6069	$C_{34}H_{48}ClNO_{11}$	Aconitine hydrochloride	681 84	149			1333
6070	$C_{34}H_{48}N_2O_{10}S$	Atropine sulfate	676 45	194			1333
6071	$C_{34}H_{48}N_2O_{10}S$	Hyoscyamine sulfate	676 45	206			1333
6072	$C_{34}H_{48}N_2O_{14}$	Aconitine nitrate	708 39				1333
6073	$C_{34}H_{49}NO_{11}$	Japaconitine	647 39	204 2			
6074	$C_{34}H_{50}ClNO_{11}$	Japaconitine hydrochloride	683 85	149			
6075	$C_{34}H_{50}O_2$	Cholesterol benzoate	490 39	145 5			
6076	$C_{34}H_{50}O_3$	Cholesterol salicylate	506 39	180			1180
6077	$C_{34}H_{54}O_{11}$	Digitoxin	638 42	244			
6078	$C_{34}H_{56}O_{16}$	Jalapin	720 43	150			
6079	$C_{34}H_{57}NO_2$	Solanidine	511 45	215			
6080	$C_{34}H_{70}$	n-Tetratriacontane	478 54	76 5	$255^{1.0}$	0 781	
6081	$C_{34}H_{70}O$	Incarnatryl alcohol	494 54	74			
6082	$C_{35}H_{38}O_{12}$	Filixic acid	650 29	184			
6083	$C_{35}H_{39}N_5O_5$	Ergotinine	609.34	229 d.			1333
6084	$C_{35}H_{41}N_5O_6$	Ergotoxine	627 36	164			
6085	$C_{35}H_{44}N_5O_{10}P$	Ergotoxine phosphate	725 40	187			
6086	$C_{35}H_{56}O_2$	Echiretin	508 43	52			
6087	$C_{35}H_{56}O_{14}$	Digitalin	700 43	217			
6088	$C_{35}H_{59}O_8$	Phytosterolene acetate	607 45	100			
6089	$C_{35}H_{60}NO_4$	Imperialine	558 47	254 d.			
6090	$C_{35}H_{70}O$	Stearone $(C_{17}H_{35})_2CO$	506 54	88		0 793_4^{95}	
6091	$C_{35}H_{72}$	n-Pentatriacontane	492 55	74 7	331^{15}	$0.782_4^{74.7}$	
6092	$C_{36}H_5O_6$	Lophopetalin	533 01	230			
6093	$C_{36}H_{34}N_2O_8S$	Aporheine sulfate	654 34	75			
6094	$C_{36}H_{34}N_2O_{13}$	Cynoctonine	702 28	137			
6095	$C_{36}H_{42}O_6$	Helleborin	570 32	> 250 d			
6096	$C_{36}H_{42}O_{13}$	Filicic acid	682 32	125			
6097	$C_{36}H_{44}N_2O_{10}S$	Codeine sulfate	696 42	278			1333
6098	$C_{36}H_{48}O_{10}$	α-Picrasmin	640 37	204			
6099	$C_{36}H_{48}O_{10}$	β-Picrasmin	640 37	212			
6100	$C_{36}H_{50}N_6O_6$	Pyramidon camphorate	662 43	90			

No.	Formula	Name	Mol. wt	M. P.	B. P.	d	R. I. No.
6101	$C_{36}H_{51}NO_{11}$	Bikhaconitine	673.40	113			
6102	$C_{36}H_{51}NO_{12}$	Pseudaconitine	689.40	211			
6104	$C_{36}H_{62}O_{31}$	Inulin	990.48	178 d		1.35	
6105	$C_{36}H_{66}O_{3}$	Oleic anhydride	546.51	22.2			
6106	$C_{36}H_{70}O_{3}$	Stearic anhydride $[CH_3(CH_2)_{16}CO]_2O$.	550.54	72			
6107	$C_{36}H_{74}$	Hexatriacontane	506.57	76.5	$265^{1.0}$	0.782^{76}	
6108	$C_{37}H_{36}N_{2}O_{9}$	Xanthaline	652.29	208			
6109	$C_{37}H_{51}NO_{11}$	Taxine	685.40	82 d.			
6110	$C_{37}H_{64}O_{2}$	Cholesterol caprinate	540.49	82.2			
6111	$C_{38}H_{44}N_{2}O_{12}$	Morphine tartrate	720.36				1333
6112	$C_{38}H_{44}N_{4}O_{2}$	Dicinchonine	588.37	40			
6113	$C_{38}H_{46}N_{2}O_{8}$	α-Truxilline	658.37	80			
6114	$C_{38}H_{46}N_{2}O_{8}$	β-Truxilline	658.37	45			
6115	$C_{38}H_{46}N_{4}O_{6}S$	Cinchonidine sulfate	686.45	242			
6116	$C_{38}H_{46}N_{4}O_{6}S$	Cinchonine sulfate	686.45	198.5			
6117	$C_{38}H_{46}N_{4}O_{8}S$	Cupreine sulfate	718.45	257 d.			
6119	$C_{39}H_{41}NO_{12}$	Adlumine...	715.32	188			
6120	$C_{39}H_{63}NO_{10}$	Zygadenine	705.49	200			
6120.1	$C_{39}H_{74}O_{6}$	Trilaurin	638.57	46.5		0.891^{65}	
6122	$C_{40}H_{40}N_{2}O_{10}S_{2}$	Quinine-β-naphtholsulfonate	772.45	186			
6124	$C_{40}H_{50}N_{4}O_{8}S$	Quinine sulfate	746.48	235.2			
6125	$C_{40}H_{56}O_{15}$	Strophantin	776.43	179			
6126	$C_{40}H_{70}O_{2}$	Homoeuonysterol	582.54	134			
6127	$C_{41}H_{50}N_{4}O_{7}$	Quinine carbonate	710.42	169			
6129	$C_{42}H_{46}N_{4}O_{8}S$	Strychnine sulfate	766.45	200			
6131	$C_{42}H_{54}N_{2}O_{7}$	Tritopine	698.43	182			
6133	$C_{42}H_{66}O_{6}$	Caulosapogenin	666.51	315			
6135	$C_{42}H_{70}O_{2}$	Echitein. .	606.54	195			
6136	$C_{43}H_{45}N_{3}O_{24}$	Quinoline tartrate	987.37	125			
6137	$C_{43}H_{57}N_{4}O_{10}P$	Quinine glycerophosphate	820.50	181			
6138	$C_{44}H_{54}N_{4}O_{8}$	Quinine succinate	766.45	192			
6139	$C_{44}H_{54}N_{4}O_{9}$	Quinine malate .	782.45	177.5			
6141	$C_{44}H_{54}N_{4}O_{10}$	Quinine tartrate.	798.45	202.5			1333
6142	$C_{44}H_{64}NO_{19}$	Glycyrrhizic acid	910.50	220			
6143	$C_{44}H_{76}O_{20}$	Sarsasaponin	924.59	248			
6144	$C_{44}H_{82}O_{3}$	Brassidic anhydride	658.63	64		0.835_4^{70}	1145
6145	$C_{44}H_{82}O_{3}$	Erucic anhydride	658.63	48			1144
6147	$C_{45}H_{86}O_{6}$	Trimyristin	722.66	55		0.885_4^{60}	1089
6148	$C_{46}H_{50}N_{4}O_{10}$	Strychnine d-tartrate	818.42	228		1.429	
6150	$C_{46}H_{56}N_{2}O_{20}S$	Narceine sulfate	988.51				1333
6151	$C_{47}H_{54}O_{16}$	Filmaron..	874.42	60			
6153	$C_{48}H_{93}NO_{9}$	Phrenosin	827.72	215 s. d.			
6154	$C_{49}H_{80}O_{23}$	Gitonin. . .	1036.6	272 d.			
6155	$C_{50}H_{66}O_{30}$	Hyssopin..	1146.5	275			
6156	$C_{50}H_{70}O_{8}$	Lupulinic acid	798.54	93			
6157	$C_{51}H_{98}O_{6}$	Tripalmitin	806.76	65.1; 46		0.866_4^{80}	1114
6158	$C_{52}H_{91}NO_{18}$	Solanine .	1017.7	254 d.			
6159	$C_{52}H_{92}ClNO_{18}$	Solanine hydrochloride	1054.2	212			
6160	$C_{52}H_{104}O_{2}$	Ceryl cerotate.	760.80	84			
6161	$C_{54}H_{88}O_{17}$	Caulosaponin (Leontin)	1008.7	255			
6163	$C_{56}H_{74}N_{4}O_{12}S$	Psychotrine sulfate..	1026.7	217			
6164	$C_{56}H_{88}O_{9}$	Caulophyllosapogenin	904.68	315			
6165	$C_{57}H_{104}O_{6}$	Glycerol trielaidate	884.80	32			
6166	$C_{57}H_{104}O_{6}$	Glycerol trioleate	884.80	−17	240^{18}	0.915	
6167	$C_{57}H_{104}O_{9}$	Glycerol triricinoleate	932.80			0.959	
6168	$C_{57}H_{110}N_{2}O_{15}$	Pyosin.... . .	1062.9	238			
6169	$C_{57}H_{110}O_{6}$	Tristearin.	890.85	54.5; 70.8		0.862_4^{80}	1115
6170	$C_{58}H_{46}O_{23}$	Fustin... ...	1110.4	219			
6172	$C_{66}H_{104}O_{17}$	Caullophyllosaponin	1168.8	260			
6173	$C_{68}H_{96}N_{2}O_{26}S$	Aconitine sulfate	1388.8				1333
6175	$C_{72}H_{88}N_{6}O_{20}$	Quinine citrate	1356.7	183.5			

REFRACTIVE INDEX

A. LIQUIDS

Serial No.	Gen index No	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No	Gen index No	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No	Gen index No	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No	Gen. index No.	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$
1	586	1.306	0.0045	86	1005	1.3927	0.0070	171	3995	1.408	0.0072	258	3988	1.421	
2	60	1.329	0.0054	87	2933	1.3929	0.0080	172	4007	1.408	0.0068	259	2407	1.4213	
3	208	1.3316	0.0061	88	724	1.3930	0.0070	173	2344	1.4082		260	569	1.4216	0.0113
4	141	1.3419	0.0051	89	2392	1.393	0.0068	174	3998	1.408	0.0072	261	2892	1.4217	0.0071
5	213	1.344	0.0060	90	3369	1.393	0.0062	175	1012	1.4086	0.0072	262	1067.1	1.4219	
6	168	1.3474	0.0058	91	1654	1.3932	0.0068	176	1100	1.4088	0.0074	263	2301	1.4223	0.0076
7	793	1.3526	0.0061	92	1659	1.3935		177	420	1.4093		264	358	1.4224	
8	513	1.3531	0.0058	93	822	1.394	0.0074	178	2934	1.4095		265	2100	1.4226	0.0070
9	1072	1.355	0.0062	94	2926	1.3947	0.0066	179	1080	1.410	0.0070	266	2405	1.4226	
10	1073	1.3564	0.0040	95	1651	1.3951	0.0068	180	2985	1.410	0.0076	267	658	1.4227	0.0075
11	1049	1.3574	0.0056	96	1630	1.3959	0.0074	181	1044	1.4103		268	4412	1.4228	
12	794 1	1.3576		97	2362	1.3959		182	1570	1.4104	0.0074	269	2351	1.423	0.0075
13	794	1.3579	0.0062	98	717	1.3960		183	1730	1.411		270	2409	1.423	0.0072
14	418	1.3591	0.0068	99	790	1.396	0.0068	184	3329	1.4110		271	3357	1.423	
15	451	1.3597	0.0063	100	2354 1	1.3960		185	3994	1.411		272	2330	1.4235	0.0075
16	480	1.3613	0.0079	101	598	1.3962		186	2331	1.4114		273	28	1.4237	0.0080
17	262	1.361	0.0061	102	686	1.3962		187	2910	1.4114		274	2965	1.4238	
18	452	1.3619	0.0062	103	2937	1.3964		188	1602	1.4115		275	220	1.4239	0.0093
19	396	1.363	0.0070	104	791	1.397	0.0068	189	4000	1.4116		276	711	1.4240	
20	447	1.3636	0.0067	105	495	1.3972	0.0081	190	657	1.4118		277	999	1.4240	
21	233	1.3639	0.0062	106	1085 1	1.3973		191	1013	1.4119	0.0073	278	2419	1.424	0.0078
22	395	1.3664	0.0060	107	228	1.3974	0.0073	192	2326	1.412	0.0090	279	2967	1.424	
23	1716	1.369	0.0064	108	2359	1.3975		194	651	1.4121	0.0081	280	3325	1.424	0.0193
24	1086	1.3695	0.0063	109	723	1.3979	0.0070	195	3335	1.4122		281	4012	1.424	0.0078
25	37	1.3714	0.0072	110	748	1.398		196	3311	1.4123	0.0071	282	4161	1.424	0.0073
26	212	1.3719	0.0066	111	821	1.398	0.0074	197	3999	1.4126		283	1557	1.4242	0.0106
27	1715	1.372	0.0065	112	2941	1.3980	0.0069	198	3986	1.4127	0.0072	284	3308	1.4242	
28	773	1.3723	0.0078	113	624	1.3984	0.0086	199	1619	1.4128		285	657 1	1.4247	
29	725	1.3727	0.0064	114	2910	1.398	0.0070	200	1070	1.4129	0.0118	286	3309	1.4248	
30	718	1.3730	0.0070	115	1640	1.399		201	1645	1.4130	0.0073	287	2403	1.425	0.0074
31	984	1.3758	0.0080	116	780	1.3993	0.0069	202	2343	1.4131	0.0073	288	2868	1.425	
32	1713	1.376	0.0065	117	671	1.3996		203	2846	1.4131	0.0073	289	465	1.4251	0.0093
33	665	1.3767	0.0051	118	1652	1.3997	0.0068	204	446	1.4134	0.0094	290	616	1.4254	0.0071
34	1714	1.377	0.0065	119	356	1.3998	0.0127	205	1730 1	1.4135		291	2406	1.4254	
35	727	1.3771	0.0066	120	2905	1.3999		206	948	1.4136	0.0051	292	2987	1.4254	
36	726	1.3779	0.0065	121	917	1.4004	0.0096	207	1643	1.4138	0.0074	293	3314	1.4259	
37	506	1.378	0.0065	122	2354	1.4005	0.0069	208	2309	1.4138	0.0072	294	4419	1.426	0.0081
38	1712	1.3783	0.0064	123	2361	1.4005	0.0069	209	3338	1.414		295	928	1.4263	
39	823	1.3786	0.0070	124	1636	1.4006	0.0071	210	4001	1.414	0.0072	296	2899	1.4268	0.0076
40	719	1.3791	0.0071	125	3365	1.4008		211	1726 1	1.4141		297	2962	1.427	0.0073
41	1741	1.3807	0.0066	126	2357	1.4009	0.0070	212	587	1.4144		298	2963	1.4270	
42	1740	1.3819	0.0065	127	1534	1.4010	0.0098	213	3982	1.4145		299	4585	1.427	0.0075
43	48	1.382	0.0080	128	1617	1.401	0.0090	214	1733 1	1.4146		300	4586	1.427	0.0074
44	1610	1.3821		129	1764	1.401	0.0081	215	2411	1.4149		301	949	1.4271	
45	2387	1.3825		130	2353	1.4012		216	1571	1.415		302	3962	1.4271	
46	146	1.3828		131	820	1.401	0.0075	217	1644	1.4150	0.0073	303	721	1.4272	
47	667	1.383		132	746	1.4015	0.0071	219	2873	1.415	0.0090	304	1612	1.4273	0.0075
48	1015	1.384		133	2901 1	1.4015		220	3993	1.415	0.0075	305	264	1.4274	0.0072
49	1019	1.3840		134	2938	1.4016		221	3336	1.4153	0.0073	306	3939	1.4275	
50	717	1.3843	0.0071	135	2912	1.402	0.0070	222	375	1.4154	0.0100	307	3975	1.4275	
51	1017	1.3844	0.0066	136	487	1.4022		223	966	1.4156	0.0081	308	2964	1.4278	
52	1020	1.3844	0.0067	137	775	1.4026	0.0080	224	2396	1.4159		309	744	1.428	0.0095
53	1739	1.3849		138	2935	1.4026		225	2896	1.4161	0.0075	310	3310	1.4284	
54	247	1.385		139	2909 1	1.4030		226	66	1.4164	0.0076	311	2386 1	1.4288	
55	2389	1.385	0.0091	140	2904	1.4035		227	189	1.4166	0.0080	312	4172	1.4289	0.0077
56	1063	1.3851		141	2912	1.4036		228	2397	1.4172		313	1027	1.429	
57	1026	1.3852	0.0063	142	1560	1.4038	0.0071	229	3936	1.4174	0.0194	314	4162	1.4293	
58	1016	1.3858	0.0068	143	3347	1.404		230	3372	1.4176	0.0084	315	449	1.4295	
59	505	1.386	0.0066	144	3349	1.4040		231	1736	1.4178		316	4153	1.4299	0.0075
60	749	1.386		145	1013	1.4043	0.0071	232	911	1.4179	0.0044	317	2867	1.430	0.0076
61	2382	1.3861	0.0064	146	937	1.4045	0.0085	233	2944	1.4184		318	2966	1.430	0.0075
62	1007	1.3862	0.0070	147	3353	1.4047		234	4178	1.4184		319	2986	1.430	0.0076
63	450	1.3868	0.0068	148	2903	1.4049		235	968	1.4185	0.0075	320	3356	1.430	0.0074
64	792	1.387	0.0067	149	1760	1.405	0.0075	236	969	1.4185	0.0105	321	1629	1.4302	
65	824	1.387	0.0075	150	1768	1.405		237	479	1.4186	0.0104	322	2953	1.4303	
66	269	1.3874		151	3354	1.405		238	1695	1.4194	0.0073	323	273	1.4306	0.0102
67	1064	1.3874	0.0071	152	378	1.4051	0.0080	239	2302	1.419		324	355	1.4306	0.0094
68	1018	1.3879	0.0066	153	1010	1.4051	0.0071	240	2320	1.4195		325	925	1.4306	0.0094
69	1001	1.3881	0.0131	154	1084 1	1.4053		241	943	1.4196	0.0091	326	3289	1.4306	
70	1004	1.3882	0.0072	155	1045	1.4056	0.0084	242	1734	1.4196	0.0071	327	3937	1.4309	0.0077
71	468	1.3886	0.0065	156	2936	1.4058		243	1561	1.4198	0.0081	329	3361	1.4310	
72	524	1.389	0.0074	157	1046	1.4060		244	1662	1.4198	0.0081	330	3363	1.431	
73	1653	1.389		158	1081	1.406	0.0070	245	1732	1.420		331	3940	1.4311	
74	1014	1.3891	0.0068	159	1003	1.406	0.0069	246	2847	1.420	0.0071	332	4843	1.4312	
75	1006	1.3895	0.0071	160	2275	1.406	0.0087	247	2955	1.4201		333	620	1.4314	0.0114
76	154	1.3898	0.0084	161	3330 1	1.4060		248	2970	1.4203		334	2412	1.4314	0.0073
77	2393	1.390	0.0068	162	3334	1.4060	0.0071	249	2971	1.4204		335	3355	1.4317	
78	809	1.3902	0.0060	163	2901	1.4065		250	3989	1.4204	0.0074	336	736	1.432	
79	1002	1.3902	0.0080	164	3333 1	1.4070		251	2400.1	1.4206		337	4852	1.4321	0.0076
80	1655	1.3903	0.0070	165	1084	1.4072	0.0070	252	896	1.4207	0.0087	338	3358	1.4322	
81	626	1.3904	0.0069	166	1079	1.4075	0.0071	253	2407 1	1.4209		339	2952	1.433	0.0073
82	972	1.3909		167	3331	1.4076		254	2954	1.4209		340	3328	1.4330	0.0076
83	1649	1.391		168	652	1.4079	0.0080	255	4411	1.4209		341	4166	1.4333	
84	242	1.392		169	1767	1.4079	0.0069	256	2399	1.421	0.0073	342	4169	1.4334	
85	625	1.3927	0.0079	170	3351	1.408	0.0071	257	2869	1.421	0.0076	343	712	1.4335	

Serial No	Gen. index No.	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No	Gen index No	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No	Gen index No	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No	Gen index No.	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$
344	3364	1.4338		434	2890	1 4503		524	2239	1 4763		616	3761	1 5042	
345	2318	1 434		435	3808	1 4505		525	106	1 4777		617	4081	1 5042	
346	464	1.4341	0.0092	436	648 3	1 4506		526	3927	1 4785		618	668	1 5046	
347	743	1 4344		437	585	1 4507	0 0087	527	3816	1 4788		619	2719	1 505	0.0159
348	3362	1.4345		438	648 2	1 451	0 0092	528	139	1 479		620	3763	1 5050	
349	192	1.4346		439	929	1.4512	0 0176	529	2797	1 4792	0 0116	621	475	1 5051	0 0148
350	158	1 4349	0 0089	440	3826	1 4515		530	4370	1 4792		622	3230	1 5051	0 0158
351	5010	1 4350		441	3917	1 4521		531	3908	1 4798		623	90	1 5055	0.0137
352	742	1.436	0 0092	442	2294	1 4524	0 0121	532	422	1 4801	0 0110	624	3679	1 5057	0 0163
353	924	1.436	0 0080	443	4010	1 4524	0 0095	533	3026	1 4803		625	4971	1 5057	
354	471	1 4362		444	1054	1 4530	0 0089	534	887	1 4805		626	2684	1 5058	0 0161
355	2849 1	1 4362		445	3805	1 4532		535	5164	1 4806	0 0102	627	2720	1 506	0 0161
356	258	1 4364	0 0126	446	285	1 4539	0 0085	536	5682	1 482		628	3154	1 506	0 0161
357	2968	1 437	0 0074	447	2888	1 4540		537	3824	1 4823		629	3678	1 506	0 0162
358	3961	1 437	0 0078	448	3893	1 4540		538	3022	1 4827	0 0096	630	815	1 5063	0 0130
359	5260	1 437	0 0076	449	5853	1 4543		539	3800	1 4828		631	4072	1 5065	
360	3303	1 4371		450	648 1	1 4550		540	5480	1 483		632	689	1 507	
361	614	1.4373	0 0149	451	1595	1 455	0 0084	541	3823	1 4846		633	2722	1 507	0 0164
362	1253	1 4375	0 0126	452	364	1 4554		542	3764	1 4848		634	4350	1 507	
363	3895	1 4376		453	4144	1 4556		543	1596	1 4867		635	4318	1.508	
364	17	1 438		454	1368 4	1 4556	0 0107	544	3865	1 4870	0 0147	636	3080	1 5081	0 0169
365	762	1 438	0 0096	455	107	1 4557	0 0091	545	1131	1 4872	0 0140	637	4827	1 5083	0 0140
366	3944	1 4380		456	5356	1 4557		546	3860	1 488		638	4545	1 5085	
367	604	1 4386	0 0082	457	5813	1 4558		547	3886	1 488		639	693	1 509	0 0127
368	811	1 4386	0 0097	458	222	1 4562	0 0110	548	5001	1 4881		640	2586	1.509	0 0188
369	3285	1 4388	0 0092	459	3889	1 4567		549	2927	1 489	0 0120	641	870	1 509	0.0163
370	927	1 4390	0 0131	460	648 4	1 4570		550	3725	1 4890		643	2775	1 5105	
371	470	1 4392		461	696	1 457		551	3765	1 4895		644	234	1 512	0.0163
372	741	1 4398	0 0089	462	3933	1 457	0 0081	552	2262	1 4903	0 0132	645	331	1.512	
373	1506	1 4404		463	2889	1 4574		553	3857	1 4911		646	2721	1 512	0.0160
374	4179	1 4404		464	3969	1 4579		554	3724	1 4914		647	183	1 5128	0 0132
375	2813	1 4407	0 0098	465	5482	1 4580		555	221	1 4915		648	3241	1 513	0 0171
376	1089	1 441		466	2340	1 4581		556	3229	1 4920	0 0147	649	3780	1 5131	0 0163
377	2812	1 4410	0 0112	467	2341	1 4590		557	4097	1 4922		650	3227	1.5132	0 0157
378	1041	1 4412	0 0083	468	2886	1 459	0 0082	558	4344	1 4922		651	404	1.5134	0 0168
379	1098	1 4412	0 0091	469	2383	1 4591		559	3728	1 4925	0 0114	652	1330	1 514	0.0169
380	1366	1 4413	0 0122	470	11	1 4595	0 0079	560	1697	1 4929	0 0125	653	4102	1 514	
381	457	1 4414	0 0077	471	1478	1 4597		561	3223	1 4930	0 0146	654	3119	1 5143	
382	1500	1 4415	0 0103	472	5371	1 4602	0 0084	562	3736	1 493	0 0140	655	5141	1 516	0 0143
383	941	1 4416	0 0082	473	3971 1	1 4603		563	4097 1	1 4930		656	2589	1 5164	0.0132
384	1252	1 4417	0 0131	474	3902	1 4606		564	3882	1 4935		657	5000	1 5164	
385	2281	1 4419		475	3992	1 4606		565	4367	1 4939		658	3751 2	1 5168	
386	655	1 442	0 0084	476	12	1 4607	0 0097	566	4342	1 494		659	2163	1.517	0.0173
387	3960	1.4420		477	3894	1 4609		567	140	1 4942		660	3235 1	1 5174	
388	5156	1 442	0 0084	478	2339	1 461		568	3226	1 4943	0 0160	661	4091 1	1 5175	
389	1042	1 4421		479	3296	1 4614		569	4980	1 4946		662	3740	1.5187	0 0157
390	814	1 4425	0 0099	480	3915	1 4623		569 1	3731	1 495	0 0144	663	3788	1 5201	0 0117
391	1576	1 4425		481	5605	1 4626		570	5078	1 4951		664	412	1 5203	0.0131
392	5688	1 4427		482	1105	1 463	0 0088	571	4098	1 4954	0 0133	665	4318	1.5207	
393	764	1 4428	0 0098	483	1372	1 4630		572	1051	1 4955	0 0131	666	2041	1.521	0.0164
394	2284	1.443		484	5606	1 4636		573	2688	1 4956	0 0158	667	4560	1 521	
395	648	1.4433		485	3947	1 4642		574	4983	1 4956		668	2713 1	1 5211	
396	1096	1 4437		486	3273	1 4643		575	1588	1 4959	0 0104	669	3755	1 5218	
397	2825	1.4438		487	1328	1 4646	0 0145	577	2683	1 4959	0 0152	670	3170	1 5226	0.0206
398	2827	1.444		488	3948	1 4649		578	755	1 4960	0 0137	671	413	1.523	0.0124
399	3295	1.4441		489	366	1 4655	0 0132	579	2112	1 4962	0 0160	672	2040	1 523	0.0165
400	190	1.4443	0 0084	490	136	1 4659		580	3228	1 4967	0 0113	673	3149	1 5232	
401	1040	1 4444	0 0089	491	4148	1 4659		581	3856	1 4967		674	3757	1 5234	
402	4387	1 4445		492	2814	1 4660	0 0151	582	3726	1 4969		675	3096	1.523	
403	1056	1 4450	0 0094	493	4374	1 4660		583	4366	1 4972		676	3655	1.5236	
404	1537	1 4451	0 0095	494	403	1 4666	0 0107	584	2685	1 4973	0 0158	677	2714	1 5240	
405	2327	1 4452		495	1756	1 467		585	3225	1 4975	0 0152	678	3752	1.524	0.0157
406	2835	1 4453		496	2882	1 467	0 0084	586	3780	1 4976		679	2503	1.5242	
407	1055	1 4454	0 0094	497	2796	1 4675		588	600	1 498	0 0117	680	3088	1 5249	0 0196
408	2283	1 4454		498	2240	1 4680		589	3677	1 498	0 0137	681	1307	1.525	0.0172
409	4381	1 4455	0 0083	499	3854	1 4690		590	4975	1 4981		682	3258	1 525	
410	3968	1.4456		500	2058	1 4691	0 0144	591	4978	1 4984		683	4090 1	1 5250	
411	619	1 4457	0 0129	501	176	1 4697	0 0112	593	3741	1 4986		684	3057	1 526	
412	4856	1 4459		502	2059	1 470	0 0142	594	3286	1.4993	0 0116	685	859	1 5261	0.0270
413	1769	1 446		503	3811	1 4700		595	3681.1	1 4995		686	2111	1 5261	0 0108
414	4376	1 4460		504	3891	1 4701		596	4974	1 4996		687	594	1.5266	0.0173
415	148	1 4462		505	2057	1 4704	0 0153	597	476	1 4997	0 0056	688	1250	1.5267	0 0232
416	1699	1 4464	0 0120	506	159	1 4711	0 0094	598	3277	1 4998	0 0213	689	3132	1.527	0 0183
417	19	1.4467	0 0080	507	3858	1 4715		599	3152	1 500		690	3664	1 5271	0.0189
418	4388	1 4468		508	863	1 4717	0 0141	600	754	1 5001	0 0140	691	2039	1 528	0.0166
419	963	1 4469		509	3913 1	1 4723		601	3727	1.5003	0 0146	692	3034	1 5282	
420	3827	1 4471		510	3810	1 4727	0 0114	602	4977	1 5005		693	576	1 5285	0.0173
421	2850	1 4476		511	3952	1 4727		603	4976	1 5007		694	4353	1.5285	
422	1692	1.4478	0 0088	512	515	1 4729	0 0078	604	1443	1 501	0 0160	695	3747	1 5286	0.0160
423	3892	1.4481	0 0092	513	3913	1 4729		605	4561	1.5011		696	45	1 5297	0.0221
424	921.1	1 4482	0 0083	514	4115	1 473		606	1365	1.5014	0 0167	697	2	1 5300	0.0117
425	5940	1.4482		515	3806	1 473	0 0118	607	4324	1 5019	0 0117	698	3656	1 5301	0.0204
426	2831	1.4486	0 0082	516	4371	1 4739		608	2810	1 5023	0 0245	699	3265	1 5305	
427	5013	1.4486		517	3879	1 4741		609	4828	1 5025		700	1249	1 5311	0 0232
428	1551	1.449	0 0169	518	3864	1 4743		610	2590	1.503	0 0149	701	699	1 5313	0.0122
429	1724	1.4490		519	1466	1.4744	0 0131	611	4999	1 5030		702	2084	1 5323	
430	926	1.4495		520	2745*	1 4745		612	589	1 5035	0.0151	703	3134	1 5335	
431	2282	1 4496		521	3924	1 4747		613	3883	1 5036		704	4064	1.5338	0 0202
432	1090	1.4499		522	368	1 4753	0 0105	614	111	1 504	0 0104	705	2571	1 5339	0 0217
433	307	1.4500	0.0090	523	582	1.4755	0 0094	615	3224	1.5042	0 0153				

Serial No	Gen. index No	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No	Gen index No	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No	Gen. index No	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen. index No.	Refractive index n_D^{20}	Dispersion $H_\beta - H_\alpha$
706	3237	1.5457	0.0168	731	1229	1.549	0.0176	756	2757	1.570	0.0217	781	102	1.6062	
707	1390	1.536	0.0216	732	2032	1.5490		757	2203	1.5714	0.0249	782	601	1.6077	
708	2618	1.5369	0.0222	733	3259	1.5492	0.0229	758	2204	1.5728	0.0230	783	1205	1.608	0.0217
709	2725	1.537	0.0180	734	2031	1.551		759	2004	1.5735	0.0315	784	1483	1.6081	0.0256
710	184	1.5379	0.0140	735	2639	1.551	0.0189	760	3642	1.5749		785	2061	1.609	0.0234
711	2038	1.539	0.0175	736	1347	1.5529	0.0252	761	2771	1.575	0.0162	786	2492	1.6094	
712	3606	1.5394	0.0210	737	1859	1.5537	0.0221	762	4930	1.576		787	1204	1.611	
713	2159	1.5309	0.0173	738	2030	1.555		763	4757	1.5761		788	3548	1.6149	0.0296
714	2161	1.540	0.0181	739	2763	1.5559	0.0225	764	1200 2	1.577		789	3549	1.616	0.0296
715	2162	1.540	0.0184	740	2633	1.556	0.0182	765	1200 1	1.5814		790	4038	1.618	0.0303
716	1488	1.5407	0.0213	741	1441	1.5562	0.0375	766	2255	1.583	0.0248	791	3069	1.6195	0.0424
716 1	1944	1.541		742	2762	1.558	0.0214	767	372	1.584		792	1333	1.621	0.0253
717	3789	1.5421	0.0220	743	964	1.559		768	1887	1.5861	0.0286	793	1369	1.6260	0.0265
718	2677	1.5425		744	2758	1.559	0.0217	769	1442	1.5863	0.0249	794	127	1.6277	0.0189
719	123	1.5437	0.0165	745	2578	1.5597	0.0270	770	2491	1.588		795	3455	1.633	0.0309
720	2195	1.5440	0.0175												
721	10	1.5442	0.0219	746	4062	1.5598	0.0283	771	2756	1.5887	0.0248	796	128	1.638	0.0183
722	1389	1.5455	0.0202	747	1294	1.560	0.0193	772	18	1.589	0.0176	797	428	1.642	
723	1230	1.546	0.0178	748	2760	1.561	0.0214	773	151	1.5890	0.0162	798	1918	1.6509	0.0349
724	2081	1.5462		749	2098	1.5620	0.0227	774	1375	1.5895	0.0240	799	3453	1.658	0.0325
725	2001	1.5464	0.0232	750	2767	1.5649	0.0230	775	4723	1.5921	0.0195	800	4263	1.6913	0.0356
726	3260	1.5469		751	1857	1.5650	0.0209	776	1376	1.5931	0.0243				
727	2160	1.547	0.0185	752	649	1.567		777	1202	1.5979	0.0161				
728	236	1.5472	0.0204	753	1856	1.567	0.0230	778	101	1.5992	0.0193				
729	2082	1.5475		754	1176	1.5671	0.0207	779	4296	1.602	0.0290				
730	3787	1.5481	0.0224	755	2123	1.5692	0.0214	780	126	1.603	0.0162				

Serial No	Gen index No	Temperature t°C	Refractive index $n_D^{t°}$	Dispersion $H_\beta - H_\alpha$	Serial No	Gen index No	Temperature t°C	Refractive index $n_D^{t°}$	Dispersion $H_\beta - H_\alpha$	Serial No	Gen index No.	Temperature t°C	Refractive index $n_D^{t°}$	Dispersion $H_\beta - H_\alpha$
801	683	0	1.3752		857	4572	15	1.4644		912	3955	17	1.4385	0.0090
802	310	0	1.4538		858	4147	15	1.4708		913	568	17	1.4467	
803	209	7	1.3597	0.0058	859	3912	15	1.4801		914	3819	17	1.4674	0.0109
804	1327	7	1.6053		860	3863	15	1.4849		915	3821	17	1.4784	
805	930	7.5	1.4341	0.0094	861	3859	15	1.4871	0.0130	916	4993	17	1.5332	
806	3054	8.2	1.571	0.0234	862	4979	15	1.4921		917	3649	17	1.5671	
807	969 1	8.4	1.417		863	117	15	1.4982	0.0233	918	4404	17.1	1.4435	0.0072
808	4339	9.5	1.5301	0.0171	864	118	15	1.4998	0.0227	919	3820	17.1	1.4774	0.0116
809	22	10	1.2675	0.0052	865	4986	15	1.5018		920	3849	17.1	1.4895	0.0157
810	4304	10.8	1.6265	0.0337	866	988	15	1.5094	0.0071	921	982	17.2	1.3817	0.0085
811	807	11	1.4198	0.0077	867	100	15	1.5219	0.0148	922	2267	17.2	1.4511	0.0111
812	3591	11	1.5425	0.0188	868	3589	15	1.5632		923	3928	17.2	1.4638	0.0085
813	2832	11.9	1.4519	0.0084	869	3590	15	1.5736		924	339	17.4	1.5337	
814	2570	11.9	1.5503	0.0229	870	29	15	1.7425		925	340	17.4	1.5369	
815	2276	12	1.4468		871	4306	15.1	1.6477	0.0404	926	2830	17.5	1.4771	0.0104
816	2337	12	1.467		872	558	15.2	1.4735	0.0103	927	609	17.6	1.4588	0.0157
817	4323	12	1.5703	0.0253	873	359	15.3	1.4302		928	3245	17.6	1.5058	0.0157
818	2824	12.5	1.4208	0.0089	874	1541	15.3	1.4526	0.0084	929	5359	17.7	1.463	0.0092
819	1535	12.5	1.4559	0.0167	875	525	15.4	1.3770	0.0071	930	3638	17.8	1.4804	0.0085
820	2453	12.5	1.5524	0.0338	876	1546	15.4	1.4213	0.0092	931	3637	17.8	1.5451	0.0169
821	2580	12.7	1.5764	0.0298	877	3128	15.5	1.5647		932	920	18	1.4079	
822	89	12.9	1.4340	0.0101	878	3122	15.7	1.5747	0.0236	933	1000	18	1.4282	0.0094
823	1078	13	1.414		879	3661	15.8	1.5196	0.0274	934	4375 1	18	1.4565	
824	3818	13	1.479		880	983	16	1.378		935	3125	18	1.5441	0.0180
825	3851	13	1.4971	0.0135	881	1613	16	1.4013	0.0090	936	3667	18	1.5680	0.0251
826	5	13	1.5831		882	942	16	1.4083	0.0076	937	4813	18	1.5933	0.0280
827	3861	13.6	1.4540	0.0083	883	737	16	1.4156		938	545	18.1	1.5004	0.0168
828	608	13.7	1.4786	0.0128	884	3874	16	1.438		939	1022	18.2	1.4513	
829	1518	13.7	1.4993	0.0141	885	1555	16	1.4506	0.0123	940	3753	18.2	1.4999	0.0136
831	4041	13.9	1.6232	0.0312	886	3304	16	1.452		941	3037	18.2	1.6283	0.0312
832	2880	14	1.458		887	2884	16	1.455		942	1568	18.3	1.4198	
833	2342	14	1.462		888	2883	16	1.458		943	916	18.3	1.4221	0.0148
834	2878	14	1.463		889	2887	16	1.458		944	400	18.4	1.4058	0.0070
835	3812	14	1.4883	0.0172	890	3923	16	1.4762		945	2855	18.4	1.4607	0.0090
836	2579	14	1.5566	0.0248	891	5003	16	1.480		946	2818	18.4	1.4904	0.0124
837	4707	14	1.610		892	908	16	1.4888	0.0149	947	1341	18.5	1.5389	0.0211
838	2336	14.4	1.4397	0.0092	893	3654	16	1.5514		948	4260	18.5	1.635	
839	3852	14.5	1.4647	0.0084	894	84	16	1.580		949	935	18.8	1.4357	0.0096
840	3919	14.5	1.4787		895	379	16.1	1.4397	0.0079	950	773 1	18.9	1.4200	
841	3666	14.5	1.5439	0.0189	896	2279	16.3	1.4554	0.0159	951	4560	18.9	1.5198	0.0195
842	2289 1	14.6	1.4505	0.0083	897	3847	16.3	1.4846	0.0126	952	170	19	1.4117	
843	979	14.7	1.4098	0.0071	898	608 1	16.3	1.4971	0.0133	953	1554	19	1.4375	
844	3574	14.7	1.5740	0.0222	899	1548	16.4	1.4458	0.0136	954	2929	19	1.4435	0.0087
845	3762	14.8	1.5104	0.0201	900	4279	16.4	1.6157	0.0296	955	3807	19	1.4724	
846	4967	14.8	1.5128	0.0153	901	918	16.5	1.4402		956	3850	19	1.4900	
847	3283	14.9	1.4463	0.0103	902	3324	16.5	1.4632	0.0090	957	4987	19	1.4992	
848	1616	15	1.4065	0.0090	903	880	16.6	1.4470	0.0129	958	4988	19	1.5002	
849	622	15	1.4257		904	934	16.6	1.4527	0.0127	959	4994	19	1.5289	0.0111
850	713	15	1.4313		905	2816	16.6	1.4561	0.0104	960	2568	19	1.5485	0.0227
851	4004	15	1.4372		906	2570	16.6	1.5460	0.0230	961	4150	19.1	1.4714	0.0134
852	1533	15	1.4421		907	2538	16.6	1.5485	0.0240	962	4023	19.3	1.6546	0.0409
853	132	15	1.4490	0.0116	908	4587	16.8	1.4419		963	2298	19.5	1.4310	0.0102
854	133	15	1.4519	0.0101	909	1519	16.8	1.5077	0.0147	964	2299	19.5	1.4355	0.0105
855	5007	15	1.4628		910	2328	16.9	1.425	0.0076	965	3959	21	1.447	
856	4834	15	1.4638		911	313	17	1.3870	0.0104	966	3639	21	1.5390	

Serial No	Gen. index No.	Temperature $t°C$	Refractive index $n_D^{t°}$	Dispersion $H_\beta - H_\alpha$	Serial No.	Gen index No	Temperature $t°C$	Refractive index $n_D^{t°}$	Dispersion $H_\beta - H_\alpha$	Serial No	Gen index No	Temperature $t°C$	Refractive index $n_D^{t°}$	Dispersion $H_\beta - H_\alpha$
967	4998	21.3	1.4979		1032	300	26.1	1.4540	0.0005	1097	560	63.1	1.4165	
968	2750	21.3	1.5591		1033	994	26.4	1.4951	0.0137	1098	288	63.9	1.4152	
969	4307	21.3	1.6544	0.0408	1034	1587	26.8	1.4877	0.0140	1099	156	65	1.4297	
970	3121	21.4	1.5370	0.0168	1035	816	27.5	1.4769	0.0126	1100	3071	66	1.5377	0.0169
971	2569	21.4	1.5407	0.0223	1036	5603	30	1.4559		1101	1231	69.9	1.5266	0.0171
972	2071	21.4	1.5637	0.0247	1037	3804	30	1.474		1102	3456	70.7	1.6079	0.0295
973	3600	21.4	1.5766	0.0311	1038	3981	31	1.4308		1103	2172	74	1.5425	0.0187
974	1496	21.6	1.4351	0.0114	1039	3126	33	1.5758	0.0295	1104	3414	76	1.6228	0.0303
975	2859	21.6	1.4766	0.0089	1040	2293	33.8	1.4561	0.0082	1105	4219	77.1	1.588	0.0205
976	4789	21.6	1.5743	0.0193	1041	5380	33.9	1.4358	0.0077	1106	3503	77.8	1.5678	0.0375
977	4814	21.6	1.6321	0.0400	1042	316	34.2	1.4146		1107	238	78.3	1.4274	0.0098
978	2928	21.9	1.4512		1043	5381	34.3	1.4347	0.0076	1108	5168	78.9	1.4283	0.0075
979	3297	22	1.4380		1044	3648	34.4	1.5537	0.0249	1109	2356	79	1.3732	0.0064
980	5765.1	22	1.4538		1045	5486	34.6	1.436	0.0076	1110	6018	79.4	1.4331	0.0077
981	3916	22	1.4604		1046	5852	35	1.4587		1111	5814	79.5	1.4283	0.0076
982	3822	22	1.4754		1047	5391	35.2	1.4349	0.0075	1112	617	79.7	1.4228	0.0126
983	3815	22	1.4770	0.0085	1048	4530.3	35.2	1.5526	0.0292	1113	5150	79.8	1.4273	0.0075
984	3813	22	1.4959		1049	2490	36	1.6332	0.0293	1114	6157	80	1.4381	
985	5005	22.2	1.4600	0.0081	1050	1011	36.5	1.3931	0.0070	1115	6169	80	1.4300	
986	3703	22.2	1.5604		1051	1627	37	1.4606	0.0078	1116	3801	80	1.4402	0.0089
987	301	22.3	1.4075	0.0093	1052	177	37.2	1.5258	0.0181	1117	5379	80.2	1.4299	0.0076
988	4559	22.3	1.4984	0.0140	1053	2096	38.6	1.5703		1118	4756	80.6	1.530	0.0187
989	2205	22.4	1.5711		1054	6056	40	1.4416		1119	5258	80.7	1.4175	0.0073
990	2199	22.5	1.5021		1055	1553	40	1.4467	0.0118	1120	5816	80.8	1.4236	0.0075
991	1357	22.5	1.5642	0.0242	1056	3272	40	1.4514	0.0150	1121	936	81	1.4342	0.0123
992	2493	22.5	1.5990		1057	5360	40	1.4533		1122	631	82.1	1.379	0.0067
993	3958	22.6	1.4484		1058	1314	40	1.5473		1123	4406	82.1	1.4183	0.0074
994	4373	22.6	1.4623	0.0083	1059	1315	40	1.5565		1124	2386	83.9	1.421	0.0083
995	46	22.7	1.4453	0.0113	1060	1316	40	1.5579		1125	6026	93.5	1.4297	0.0076
996	893	22.7	1.4852	0.0166	1061	4060.1	40	1.5726	0.0327	1126	3507	98.7	1.6206	0.0324
997	2468	22.7	1.5645	0.0231	1062	4039	40	1.6026	0.0289	1127	4218	98.8	1.6048	0.0293
998	2134	22.7	1.5760		1063	860	40.3	1.5238		1128	5402	99	1.5839	0.0219
999	3601	22.9	1.5194	0.0268	1064	1413	41	1.5425	0.0189	1129	2548	99.2	1.5522	0.0242
1000	2384	23	1.4531		1065	5610	42.9	1.434	0.0075	1130	5063	99.2	1.6762	0.0556
1001	4563	23	1.5300	0.0264	1066	4174	45.2	1.4294	0.0076	1131	921.2	99.3	1.4657	0.0121
1002	1430	23	1.5861	0.0231	1067	5694	45.3	1.4346	0.0076	1132	1206	99.3	1.5743	0.0204
1003	3547	23	1.6141	0.0298	1068	3587	46	1.5836		1133	4024	99.4	1.6211	0.0387
1004	2505	23.1	1.5272		1069	931	46.7	1.4434	0.0123	1134	4897	99.4	1.6803	0.0541
1005	3701	23.1	1.5802	0.0244	1070	239	47	1.415	0.0098	1135	3584	99.4	1.6828	
1006	3702	23.1	1.5898		1071	4297	47.3	1.5932	0.0281	1136	4899	99.4	1.6959	0.0591
1007	886	23.2	1.4365	0.0147	1072	993	48	1.4126	0.0079	1137	3583	99.4	1.7083	0.0615
1008	1628	23.3	1.4329	0.0094	1073	30	48	1.4418	0.0085	1138	3291	99.5	1.4760	0.0094
1009	314	23.4	1.4597	0.0102	1074	3802	48	1.4621		1139	5223	99.5	1.5021	0.0133
1010	4375	23.4	1.4619	0.0082	1075	2464	48	1.6231	0.0343	1140	4640	99.5	1.6959	0.0561
1011	4156	23.4	1.4624		1076	3412	48.5	1.6338	0.0305	1141	2819	99.6	1.4621	0.0094
1012	3191	23.4	1.5798		1077	56	48.6	1.4616	0.0149	1142	5224	99.6	1.5022	0.0134
1013	3192	23.4	1.5933	0.0302	1078	5876	50	1.4663		1143	3494	99.6	1.5827	0.0287
1014	4448	23.4	1.6060	0.0278	1079	5805	50	1.4689		1144	6145	100	1.4347	
1015	561	23.5	1.5231	0.0170	1080	3550	51.2	1.6703	0.0424	1145	6144	100	1.4366	
1016	1700	23.6	1.4464		1081	4305	53.2	1.6443	0.0439	1146	2864	100	1.4811	0.0085
1017	1482	23.6	1.4992	0.0175	1082	4447	53.5	1.5975	0.0268	1147	4947	100	1.5080	0.0060
1018	1444	24	1.5043		1083	1331	56	1.5010	0.0173	1148	3144	100	1.5345	0.0177
1019	4241	24	1.5826		1084	1251	56	1.5150	0.0225	1149	3417	100	1.6002	0.0291
1020	1701	24.3	1.4463		1085	5763	57.1	1.448	0.0084	1150	3418	100	1.6235	0.0318
1021	2289.3	24.4	1.4432	0.0083	1086	1480	57.7	1.6339	0.0305	1151	946	106.4	1.4188	0.0065
1022	3728.1	24.5	1.4877	0.0139	1087	2206	59.1	1.5532		1152	4119	107.2	1.480	0.0145
1023	4385	25	1.4555	0.0080	1088	4851	60	1.4308		1153	482	107.8	1.4161	0.0090
1024	5875	25	1.4875		1089	6147	60	1.4429		1154	3282.1	109.4	1.4482	0.0085
1025	3687	25	1.5252		1090	2263	60	1.4787	0.0228	1155	3307	110.6	1.4303	0.0077
1026	3036	25.1	1.6223	0.0302	1091	563	61	1.4953		1156	782	113	1.446	0.0097
1027	2289.2	25.2	1.4431	0.0082	1092	1858	61	1.5553	0.0246	1157	2585	114.6	1.512	0.0187
1028	1885	25.5	1.5257	0.0191	1093	1961	61.5	1.5557		1158	4652	129	1.6567	
1029	2338	26	1.4558		1094	1962	61.5	1.5577		1159	5340	130.4	1.480	0.0133
1030	4490	26	1.575	0.0205	1095	1963	61.5	1.5647		1160	2007	131.9	1.504	0.0191
1031	4226	26	1.6644		1096	2083	62.5	1.5346		1161	3938	133.3	1.422	0.0078

B. SOLIDS

I. Mean Values

Serial No	Gen index No	Refractive index n_D^{20}	Serial No	Gen index No	Refractive index n_D^{15}	Serial No	Gen index No	Refractive index n_D^{20}	Serial No	Gen. index No.	Refractive index n_D^{20}
1162	481	1.4156	1164	1578.1	1.53	1165	5664	1.635	1166	414	1.755
1163	1070.1	1.525									

II. Uniaxial Group

Serial No.	Gen. index No	Refractive index		Serial No	Gen. index No	Refractive index		Serial No	Gen. index No	Refractive index		Serial No	Gen. index No	Refractive index	
		ω	ϵ			ω	ϵ			ω	ϵ			ω	ϵ
1167	55	1.484	1.602	1173	238*	1.54	1.46	1179	2174	1.569	1.666	1184	1416	1.633	1.626
1168	3973	1.497	1.476	1174	808	1.544	1.521	1180	6075	1.579	1.540	1185	2454	1.646	1.642
1169	535	1.499	1.49	1175	5002	1.545	1.548	1181	4043.1	1.581	1.493	1186	4672	1.6588	1.6784
1170	3756	1.525	1.609	1176	5142.1	1.545	1.548	1182	1769.1	1.590	1.650	1187	1625	1.700	1.640
1171	2373	1.529	1.513	1177	697.1	1.554	1.515	1183	4272	1.600	1.649	1188	4727	1.717	1.563
1172	2915	1.530	1.430	1178	1093	1.559	1.548					1189	21	1.800	1.750

* Stable modification

III. Biaxial Group

Serial No	Gen index No	Refractive index			Serial No	Gen index No	Refractive index			Serial No	Gen. index No	Refractive index		
		α	β	γ			α	β	γ			α	β	γ
1190	679 1	1.367	1.409	1.536	1235	1688	1.545	1.546	1.837	1280	4330 1	1.564	1.628	
1191	361	1.4162	1.4603	1.5502	1236	786		1.547		1281	4752	1.621	1.629	1.661
1192	4184	1.402	1.463	1.617	1237	1530 1		1.548		1282	4913	1.500	1.630	1.640
1193	4218	1.407	1.468	1.620	1238	2916 1		1.550		1283	5317	1.620	1.632	1.650
1194	147	1.440	1.475	1.625	1239	853 1	1.459	1.555	1.582	1284	306		1.633	
1195	4397*		1.478		1240	988 1	1.546	1.559		1285	788		1.635	
1196	4368 3†	1.471	1.479	1.510	1241	778	1.519	1.561	1.591	1286	5317*	1.543	1.636	1.684
1197	2920		1.484		1242	4396	1.5376	1.5651	1.5705	1287	3585		1.637	
1198	238†	1.370	1.485	1.585	1243	1032	1.551	1.567	1.571	1288	5319	1.607	1.642	1.675
1199	5066 1		1.488		1244	3964		1.570		1289	5067 1	1.621	1.643	1.648
1200	2234 1		1.496		1245	1472	1.56	1.57	1.60	1290	3087	1.505	1.645	1.655
1201	4368 3‡	1.479	1.496	1.524	1246	3716	1.54	1.571	1.59	1291	4750	1.587	1.646	1.769
1202	1507*	1.494	1.498	1.509	1247	5313 1	1.544	1.572		1292	1111 1	1.626	1.646	1.712
1203	2808 1	1.487	1.499	1.566	1248	1034	1.555	1.573	1.577	1293	5082 1	1.612	1.647	1.662
1204	2260 1	1.488	1.501	1.527	1249	493 1	1.515	1.575	1.586	1294	5213 1		1.650	
1205	776		1.503		1250	3199	1.560	1.576	1.647	1295	5304	1.463	1.653	1.780
1206	270	1.445	1.505	1.540	1251	5477	1.510	1.578	1.618	1296	4748	1.621	1.654	1.691
1207	996		1.509		1252	3778	1.5535	1.5787	1.5912	1297	1985	1.412	1.662	1.756
1208	994 1		1.510	1.607	1253	835	1.55	1.581		1298	5561	1.580	1.665	1.690
1209	3742		1.512		1254	708	1.549	1.583	1.625	1299	4749	1.586	1.668	1.680
1210	4008	1.505	1.512	1.524	1255	3194	1.556	1.587	1.700	1300	1987	1.479	1.669	1.734
1211	5028 1	1.511	1.512	1.836	1256	3111	1.535	1.592	1.760	1301	5428 1	1.529	1.670	1.716
1212	2260 2	1.495	1.513	1.672	1257	5228	1.522	1.594	1.616	1302	1149	1.640	1.670	1.810
1213	947 1	1.500	1.515	1.535	1258	161	1.538	1.600	1.602	1303	3539	1.493	1.675	1.739
1214	3344		1.520		1259	3222	1.550	1.600	1.680	1304	5442	1.570	1.685	1.690
1215	975 1	1.443	1.520	1.589	1260	5648	1.560	1.600	1.610	1305	1111 2	1.619	1.688	1.696
1216	5061		1.524	1.566	1261	976		1.6015	1.6187	1306	2566 2	1.597	1.692	1.806
1217	2373 1	1.528	1.529	1.537	1262	1530 2		1.602		1307	4058	1.5697	1.6935	1.7324
1218	1070 2	1.510	1.530	1.568	1263	1960		1.602		1308	84.1	1.631	1.698	1.713
1219	1672	1.523	1.531	1.534	1264	5320	1.574	1.602	1.647	1309	3103	1.479	1.710	1.810
1220	629	1.450	1.534	1.610	1265	4936 1	1.526	1.603		1310	4322	1.583	1.73	
1221	1705	1.525	1.535	1.560	1266	977	1.490	1.605	1.620	1311	445	1.490	1.743	1.872
1222	639	1.4955	1.5352	1.6045	1267	609 1	1.530	1.605	1.658	1312	4739	1.464	1.718	1.946
1223	67 1	1.4227	1.5358	1.5545	1268	3234	1.538	1.609	1.754	1313	1197	>1.56	1.75	>1.95
1224	638	1.495	1.536	1.605	1269	3208	1.600	1.610	1.675	1314	1200	1.650	1.760	1.870
1225	484	1.515	1.540	1.575	1270	1977	1.609	1.612	1.616	1315	1142	1.763	1.787	1.857
1226	5336	1.520	1.540	1.580	1271	3510	1.460	1.614	1.697	1316	87	1.740	1.847	1.863
1227	2367 1	1.536	1.540	1.541	1272	1414	1.604	1.614	1.734	1317	5818	1.524	1.867	1.873
1228	1035	1.532	1.541	1.549	1273	3732		1.615		1318	1412	1.508	1.870	1.907
1229	4394*	1.517	1.542	1.555	1274	241	1.495	1.615	1.650	1319	3060	1.535	1.873	1.893
1230	2372		1.543		1275	1415	1.578	1.620	1.627	1320	1364	1.51	>1.95	1.505
1231	1037	1.517	1.544	1.546	1276	3196	1.495	1.625	1.807					
1232	4318 1		1.545		1277	5202	1.580	1.625	1.645					
1233	303	1.4380	1.5457	1.5942	1278	5441	1.610	1.625	1.675					
1234	61 1	1.507	1.540	1.546	1279	5562	1.620	1.625	1.630					

MISCELLANEOUS

Serial No	Gen index No	α	β	γ	Serial No	Gen index No	α	β	γ	Serial No	Gen. index No	α	β	γ
1321	5135 1		1.524 (red)		1326	5221	1.49		1.58	1331	5541	1.625		1.690
1322	5244 1	1.529	1.533 (red)		1327	1069 1	1.495		1.565	1332	5424	1.652		1.768
1323	835 1		1.564 (red)		1328	610	1.570		1.660	1333	Bolland, 57, **31**: 390, 10, approximate data only			
1324	868	1.385		1.530	1329	4500	1.583		1.747					
1325	3873*	1.480		1.522	1330	2135	1.602		1.627					

*Hydrated form †Metastable modification ‡Stable modification

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1138, 2009, 2051, 2185, 2805, 3201, 3238, 3594, 4219, 4393, 5344, 5602, 5691, 5814, 5862, 1993, 5379, 238, 2091, 2913, 6058, 1985, 4204. **70:** 𝔅908, 𝔅1077, 𝔅2638, 𝔅3270, 320, 351, 802, 932, 1220, 1463, 1501, 2272, 2510, 3065, 3457, 3791, 3925, 4158, 4195, 4772, 5193, 5526, 5553, 5893, 6014, 𝔅2056, 2044, 3991, 4242, 𝔅120, 6169. **71:** 1377, 1809, 1963, 2069, 2670, 3198, 3462, 3622, 4549, 4764, 5061, 5611, 1324, 1396, 2068, 4734, 𝔅2464. **72:** 𝔅116, 𝔅275, 𝔅1141, 𝔅1971, 𝔅2481, 𝔅3149, 617, 1261, 1437, 1808, 1832, 1970, 2042, 2532, 2879, 3010, 3242, 3768, 4042, 4786, 5854, 5857, 5959, 6106, 𝔅2076, 1172, 2543, 311. **73:** 𝔅168, 𝔅915, 𝔅1878, 𝔅2614, 2469, 2173, 2592, 4912, 4919, 𝔅286, 𝔅2713, 962, 2455, 𝔅202. **74:** 𝔅647, 𝔅1948, 𝔅1988, 195, 380, 491, 674, 1703, 2085, 2726, 3558, 3595, 3686, 4393.1, 4480, 4742, 4769, 5154, 5692, 5773, 5991, 6013, 6081, 1666, 6091, 142. **75:** 𝔅239, 𝔅389, 𝔅643, 𝔅866, 𝔅1626, 𝔅2044, 𝔅2848, 455, 584, 738, 842, 1371, 1806, 1919, 2561, 2682, 2705, 2749, 3193, 3775, 4233, 4285, 5313, 5364, 5422, 5847, 6048, 6093, 1151, 𝔅679, 𝔅1796, 784, 4207, 5173. **76:** 𝔅270, 𝔅3204, 292, 441, 907, 957, 1665, 2306, 2452, 2844, 2980, 3044, 3468, 3697, 3712, 4072, 4950, 5366, 5375, 5410, 5941, 𝔅2055, 570, 1210, 5823, 6080, 6107, 2584. **77:** 𝔅932, 𝔅2033, 2540.2, 3254, 3544, 3745, 4389, 5067.1, 5405, 5607, 5638, 𝔅2231, 1247, 2147, 3583, 5837, 5878, 𝔅2498. **78:** 𝔅2757, 𝔅2976, 664, 673, 975, 2055, 2425, 3380, 3746, 3778, 3792, 4034, 4239, 4433, 5000, 5280, 5387, 5639, 5879, 5962, 710, 79, 2537, 4187, 2117. **79:** 𝔅293, 𝔅909, 𝔅2733, 214, 482, 731, 1269, 1522, 2131, 2212, 3233, 3290, 3474, 3713, 4067, 4330.1, 4792, 5284, 5386, 5411, 5824, 5835, 1302. **80:** 𝔅139, 𝔅144, 𝔅181, 𝔅655, 𝔅683, 𝔅827, 𝔅1535, 𝔅1857, 𝔅3071, 152, 1209, 2129, 2179, 3705, 3722, 3732, 3777, 3875, 4319, 4647, 4798, 4899, 5220, 5492, 5920, 6113, 3494, 1305, 𝔅2240, 3394, 3631, 1924. **81:** 𝔅2020, 238, 1257, 1664, 1690, 2596, 3387, 3428, 3543, 4026, 4466, 4903, 5073, 5369, 5501, 5855, 5223, 5385. **82:** 𝔅245, 𝔅249, 93, 167, 197, 394, 1450, 1513, 1621, 1872, 1967, 2207, 2558, 2694, 2727, 2843, 2916, 4271, 4640, 4702, 5174, 5545, 5808, 6109, 6110, 3091, 3603, 5968, 5916. **83:** 1127, 1181, 1263, 1286, 1600, 2056, 2125, 2950, 3080, 3165, 3970, 4432, 5178, 5365, 5766, 6026, 𝔅2057, 1217, 3392, 𝔅2000, 5840. **84:** 1187, 1304, 1418, 3216, 3410, 3749, 3750, 4425, 4506, 1985, 5263, 5407, 5592, 5765, 5768, 6160, 𝔅649. **85:** 325, 398, 1153, 1352, 1580, 1766, 2510, 2695, 2993, 3315, 3370, 3519, 3627, 4833, 4907, 5383, 5384, 5799, 𝔅458, 2997, 4332, 5858, 1996. **86:** 𝔅1449, 𝔅3269, 217, 1021, 1119, 1138, 1753, 2045, 2166, 2573, 2662, 2799, 2808.1, 3596, 4476, 4892, 4897, 4924, 5135.1, 5349, 6008, 𝔅2735, 1162, 1206, 5984. **87:** 864, 1036, 1164, 1218, 1378, 1567, 1574, 2682.1, 2918, 3107, 4079, 4152, 4195, 4390, 4997, 5408, 5593, 𝔅1974, 1156. **88:** 201, 240, 290, 1184, 1301, 2065, 2542, 3391, 3418, 4368.3, 4519, 4536, 4698, 5025, 5163, 5219, 5436, 6015, 6090, 𝔅2032, 2253. **89:** 𝔅133, 𝔅375, 175, 677, 1039, 1111.2, 1132, 1855, 2811, 3013, 3537, 4206, 4209, 4522, 5085, 5119, 5244.1, 5286, 5583, 5673, 5779, 5922, 𝔅2078, 2471, 3396, 6043, 1272. **90:** 𝔅157, 𝔅983, 𝔅1002, 𝔅1627, 𝔅1708, 129, 350, 1111.1, 1185, 1440, 1449, 1582, 2533, 3401, 3524, 4258, 4521, 4927, 5341, 5418, 5762, 5951, 6100, 5745. **91:** 𝔅253, 𝔅1468, 𝔅1910, 𝔅1960, 𝔅2069, 843, 898, 1300, 2094, 2462, 3163, 3213, 3400, 4515, 4958, 5142.1, 5230, 5801, 6011, 6054, 𝔅648, 𝔅2019, 2142. **92:** 𝔅171, 504, 1200.6, 3388, 3706, 4703, 4915, 4928, 5308, 5412, 5438, 5533, 5633, 5830, 5955, 𝔅2058, 1159, 1211, 3783, 5402, 𝔅1998, 6024. **93:** 𝔅391, 1989, 2087, 2555, 2564, 2995, 3124, 4127, 4184, 4436, 4530.2, 5002, 5453, 4709, 4918, 1964, 5044, 5579, 5618, 6027, 6156, 𝔅1882, 543, 846, 5845. **94:** 𝔅1082, 1336, 1381, 1769.1, 2222, 2286, 3060, 3460, 4969, 5781, 5802, 5938, 2540.1, 3471, 2089. **95:** 𝔅368, 𝔅650, 𝔅727, 𝔅2149, 𝔅2609, 39, 281, 952, 2139, 2208, 2582, 3100, 3427, 4218, 4360, 4710, 4795, 5162, 5179, 5287, 5617, 5872, 6057, 1990, 4672, 𝔅2034, 1372, 4921 **96:** 𝔅2968, 69, 1160, 1196, 1246, 1340, 1350, 1566, 2139, 2385, 2520, 3123, 3507, 3580, 3714, 3744, 4275, 4509, 5231, 5601, 5675, 2647, 𝔅291, 𝔅1802. **97:** 𝔅2021, 𝔅2625, 211, 284, 662, 1241, 1922, 1991, 2653, 3390, 3522, 4082, 4868, 4906, 5065, 5363, 5555, 5667, 5904, 𝔅1865, 946, 5128. **98:** 𝔅1648, 𝔅1972, 157, 955, 1433, 1564, 1890, 2614, 2829, 3302, 4113, 5221, 5640, 5974, 2145, 𝔅2001, 1123, 5306, 6007. **99:** 144, 579, 996, 1118, 1356, 1995, 2250, 2539, 2617, 3231, 3523, 3867, 4325, 4645, 4896, 5954, 𝔅1812, 4652. **100:** 𝔅22, 𝔅241, 𝔅534, 𝔅563, 𝔅564, 𝔅651, 𝔅784, 𝔅786, 𝔅792, 𝔅796, 𝔅842, 𝔅851, 𝔅860, 𝔅878, 𝔅879, 𝔅910, 𝔅914.1, 𝔅1108, 𝔅1168, 𝔅1197, 𝔅1398, 𝔅1454, 𝔅1540, 𝔅1613, 𝔅1713, 𝔅1716, 𝔅1943, 𝔅2297, 𝔅2629, 𝔅2729, 𝔅2791, 𝔅2793, 𝔅2920, 𝔅3155, 𝔅3312, 635, 1199, 1248, 1526, 1943, 2285, 2448, 2615, 2998, 3784, 4013, 4401, 4797, 5124, 5133, 5215, 5250, 5132, 5725, 5880, 2475, 2515, 3751, 4451. **101:** 259, 540, 1688, 2562, 3008, 3207, 3422, 3466, 3621, 4854, 5622, 270, 1149, 2304, 𝔅1975. **102:** 𝔅230, 𝔅1113, 1094, 1499, 3199, 3287, 3301, 3525, 3641, 4236, 4410, 5077, 5965, 2585, 502, 3282.1, 5038. **103:** 𝔅927, 𝔅1240, 𝔅3054, 894, 1095, 1313, 1525, 2105, 2308, 3393, 3435, 3489, 4517, 4641, 4752, 4855, 5175, 1479. **104:** 𝔅122, 𝔅162, 𝔅652, 𝔅3040, 271, 1264, 1276, 1497, 1674, 1926, 1928, 2104, 2169, 2373, 2943, 2996, 3082, 3200, 3772, 3829, 4437, 4688, 5194, 5937, 6016, 3979. **105:** 𝔅128, 𝔅988, 𝔅2919, 72, 1035, 1242, 1308, 1382, 1414, 2140, 2183, 2252, 2735, 2991, 3179, 3506, 3520, 3867.1, 4368.2, 4713, 4951, 4960, 5082.4, 5409, 5500, 5664, 5939, 6012, 𝔅2035, 782, 1994. **106:** 𝔅431, 𝔅1162, 702, 1057, 1077, 1155, 1317, 1932, 2005, 2648, 2931, 3665, 4302, 5165, 5236, 5524, 5570, 5687, 5734, 5891, 1895, 3307. **107:** 𝔅160, 𝔅653, 𝔅3265, 871, 922, 1436, 1931, 2305, 3077, 3415, 3535, 3930, 4196, 4237, 4807, 5115, 5394, 2782 **108:** 𝔅2022, 𝔅2114, 182, 483, 1282, 2011, 2130, 2173, 2227, 2863, 3423, 4051, 4087, 4257, 4434, 4475, 4537, 4730, 5055, 5710, 𝔅2002, 250, 2574. **109:** 𝔅1242, 𝔅3251, 298, 1829, 2144, 2367.1, 2583, 2622, 3287, 4058, 4080, 4243, 4368.5, 4913, 4922, 5390, 5616, 3399, 3477, 𝔅1078, 2456. **110:** 𝔅30, 𝔅32, 𝔅106, 𝔅221, 𝔅459, 𝔅533, 𝔅726, 𝔅925, 𝔅941, 𝔅978, 𝔅1076, 𝔅1089, 𝔅1172, 𝔅1673, 𝔅1707, 𝔅1728, 𝔅2070, 𝔅3203, 𝔅3333, 143, 187, 700, 785, 958, 1115, 1709, 1752, 2149, 2168, 2820, 2822, 2919, 3062, 3194, 4272, 4866, 5177, 5499, 5507, 5693, 5732, 5787, 3551, 𝔅1976, 2461, 2586. **111:** 𝔅3334, 947, 1161, 1225, 1295, 1403, 1923, 2300, 2598, 3029, 3164, 3800, 4281, 4455, 4552, 4894, 5094, 5249, 5423, 5795, 945, 4935, 1275, 1397. **112:** 𝔅654, 𝔅2990, 322, 537, 740, 1212, 1386, 1841, 1921, 2133, 2368, 2665, 3499, 3607, 5185, 5233, 5400, 5674, 5771. **113:** 905, 1351, 1495, 1795, 1853, 3145, 3395, 3403, 4058, 4214, 5138, 5246, 5671, 6101. **114:** 𝔅250, 289, 641, 1193, 2681, 2920, 3063, 3112, 3421, 4580, 4700, 4729, 5129, 2649, 𝔅974, 4465. **115:** 𝔅295, 𝔅985, 𝔅1032, 𝔅1131, 𝔅1133, 𝔅1644, 𝔅1704, 678, 1122.1, 1299, 1312, 1353, 2531, 2560, 2744, 3158, 3425, 3464, 3472, 3604, 4105, 4186, 5039, 5198, 5538, 5715, 6041, 3643.1, 5235, 1287. **116:** 𝔅3347, 321, 349, 760, 1128, 1186, 1971, 2006, 2110, 2315, 2472, 2595, 3141, 3411, 4077, 4384, 4439, 4453, 4648, 4801, 4901, 5034, 5584, 1271, 3668. **117:** 𝔅183, 𝔅989, 866, 953, 1122.2, 2148, 2166, 2994, 3458, 3608, 3795, 4043.1, 4753, 5325, 4008, 2576, 4774, 1155.1, 1565, 1992, 4293, 5071, 5208, 5903. **118:** 𝔅2132, 261, 1183, 1195, 1214, 1224, 1309, 1383, 1830, 2090, 2187, 2613, 2930, 3211, 3629, 3794, 4112, 5123. **119:** 21, 1213, 1718, 1788, 3136, 3718, 4469, 4570, 5099, 5126, 5350, 𝔅1083, 188, 3884, 571, 1158, **120:** 𝔅166, 𝔅179, 𝔅274, 𝔅566, 𝔅709, 𝔅820, 𝔅905, 𝔅992, 𝔅1135, 𝔅1715, 𝔅2117, 𝔅2440, 𝔅2504, 𝔅2956, 𝔅3108, 245, 352, 1125, 1194, 1221, 1265, 1292, 1488, 1930, 2027, 2511, 2527, 2597, 2679, 2746, 3024, 3419, 3447, 3534, 3581, 4110, 4955, 5237, 5252, 5325.1, 5406, 5589, 5665, 5714, 𝔅379. **121:** 𝔅3029, 178, 363, 1130, 1192, 1749, 2307, 2530, 3007, 4762, 4783, 4839, 4900, 5074, 5111, 5454, 5571, 1827, 2007, 𝔅922, 1197. **122:** 313.1, 1174.1, 1824, 1877, 2236, 2458, 3503, 3508, 4459, 4818, 5116, 5554, 5980, 8, 2502. **123:** 𝔅242, 𝔅979, 81, 947.1, 954, 1122, 1447, 1487, 1833, 1997, 3169, 3313, 3404, 3461, 5461, 5466, 𝔅251, 4245. **124:** 𝔅2025, 330, 592, 1686, 1878, 2566, 1504.1, 3429, 3618, 4192, 4361, 4477, 4708, 4739, 5062.1, 5465, 5829, 5869, 5947. **125:** 𝔅172, 𝔅656, 𝔅705, 𝔅746, 𝔅904.2, 𝔅3048, 836, 1311, 1502, 2077, 2170, 2535, 2593, 2731, 3166, 3429.1, 3448, 3510, 3536, 3782, 4123, 4128, 4749, 5117, 5598, 5804.1, 5841, 6096, 6136, 5613. **126:** 𝔅531, 521, 697.1, 808, 1348, 1672, 1689, 2877, 3139, 4063, 4274, 4461, 4805, 5144, 5728, 5930, 1279, 861, 3465, 5281. **127:** 𝔅152, 𝔅706, 𝔅1658, 𝔅2116, 1203, 1222, 1358, 1999, 2224, 2661, 2750, 2916.1, 3217, 3504, 3585, 3938, 4135, 4539, 4677, 4796, 4799, 5428.1, 5497, 5505, 1190, 2141. **128:** 𝔅1665, 291, 463, 1108, 1710, 2211, 2416, 2693, 3463, 3485, 3839, 3881, 4009, 4355, 4681, 5712, 4286. **129:** 𝔅2606, 636, 761, 872, 1387, 1783, 2093, 2220, 2601, 2674, 3059, 3167, 3431, 3437, 3934, 4249, 4301, 4420, 4744, 4806, 4961, 5096, 5340, 5621, 1260, 5204, 4216. **130:** 𝔅24, 𝔅178, 𝔅848, 𝔅1181, 𝔅2303, 𝔅2676, 104, 634, 1607, 1826, 1842, 1910, 1933, 1972, 2070, 2072, 2109, 2839, 3045, 3374, 4021, 4695, 5070, 5101, 6035, 6063, 574, 680, 2566.1, 3095, 2431. **131:** 1038, 1244, 2000, 2493.1, 3026, 3397, 3602, 4289, 4755, 5102, 5415, 5794, 5864, 6051, 2699, 3159. **132:** 𝔅140, 𝔅646, 𝔅1255, 906, 1682, 2176.1, 2324, 2563, 3030, 3058, 3140, 3424, 3838, 4369, 5534, 5741, 5886, 4923, 4936, 55. **133:** 𝔅369, 326, 867, 975.1, 1226, 1681, 1683, 2612, 2673, 3012, 3072, 3075, 3256, 3496, 4234, 4334, 4468, 4623, 4728, 4811, 5157, 3087, 5551. **134:** 899, 1180, 1278, 1354, 1419, 1504, 2860, 3073, 4454, 4699, 5515, 5539, 5908, 6126, 1498, 1825, 1952, 4651. **135:** 𝔅986, 630, 904, 1070.2, 1461, 1462, 2180, 2215, 2371, 3027, 3420, 3449, 3528, 3716, 4485, 4497, 5275, 5456, 5612, 5615, 360. **136:** 862, 1144, 1400, 1891, 2999, 3282.2, 4052, 4687, 4826, 5188, 5225, 5527, 5700, 5723, 5890, 5934, 5388, 5105. **137:** 1058, 1344, 1360, 1669, 2600, 2730, 3014, 3031, 3161, 3501, 3797, 4313, 4335, 4925, 5098, 5403, 5445, 6094, 1925, 2228. **138:** 454, 1137, 1361, 1711, 2146, 2652, 3442, 3513, 4704, 5952, 5997, 6025, 5995. **139:** 1071, 1823, 3176, 4781, 4808, 4904, 5596, 5746, 1481. **140:** 𝔅583, 𝔅728, 𝔅907, 𝔅987, 𝔅1074, 𝔅1106, 𝔅1136, 𝔅1396, 𝔅3201, 638, 1147, 2078, 2264, 2536, 2845, 2875, 3380, 3515, 3616, 4358, 4920, 5058, 5078, 5417, 5597, 5935, 5996, 6005, 1420, 5130, 5774, 1860. **141:** 138, 551, 572, 1355, 1951, 2024, 2025, 3178, 3377, 3672, 3711, 4054, 4367.3, 4568, 4952, 5088, 5095, 5114, 1898, 3102. **142:** 𝔅539, 𝔅803, 𝔅1254, 𝔅2988, 98, 1563, 3032, 3344, 3719, 4015, 4426, 4479, 5288, 5339, 5558, 6020, 5027, 1982. **143:** 𝔅931, 𝔅1142, 𝔅1451, 𝔅1868, 1401, 2268, 2680, 3373, 3502, 3505, 3771, 4229, 4276, 4654, 4675, 4748, 4959, 𝔅496, 5309, 1818, 𝔅444. **144:** 𝔅471, 𝔅981, 𝔅1864, 781, 1274, 1673, 1676, 1907, 2529, 2541, 3113, 3138, 3696, 3887, 4462, 4766, 5319, 5479, 5873, 2214, 2689. **145:** 336, 889, 1238, 1668, 2074, 2088, 2876, 3408, 3436, 3492, 3841, 4422, 4811, 5069, 5118, 5414, 5548, 6075. **146:** 𝔅269, 308.1, 869, 1677, 2948, 3275, 3281, 4200, 4644, 5697, 5708, 14, 1979, 4472, 𝔅170. **147:** 𝔅2135, 1223, 1799, 1831, 2135, 2565, 2626, 3490, 4133, 4817, 5399, 5541, 5595, 5868, 1897, 2692, 5628. **148:** 633, 1145, 1280, 1398, 1406, 1845, 2602, 3187, 3500, 3831, 4518, 4548, 4692, 4732, 4865, 5112, 5427, 5933, 873, **149:** 𝔅1536, 2517, 2656, 4259, 4605, 4942, 5104, 5634, 6069, 6074, 3674, 57. **150:** 𝔅159, 𝔅161, 𝔅454, 𝔅540, 𝔅541, 𝔅885, 𝔅965, 𝔅1090, 𝔅1183, 𝔅1625, 𝔅1942, 𝔅1961, 𝔅2009, 𝔅2026, 𝔅2043, 𝔅3032, 𝔅3111, 53, 114, 305, 542, 1503, 1678, 1796, 1802, 1939, 2516, 2728, 2932, 3011, 3210, 3248, 3611, 3624, 3886.1, 4074, 4382, 4538, 4738, 4784, 5026, 5076, 5990, 6031, 6078, 2556. **151**: 𝔅137, 1562, 2734, 3426, 4141. **152**: 𝔅247, 70, 219, 575, 1451, 1524, 1846, 2138, 2308.1, 3475, 3559, 3675, 3888, 4199, 4227, 4486, 4607, 4671, 4819, 5145, 5239, 5899, 2607. **153**: 𝔅899, 437, 1037, 1379, 1507, 1748, 1798, 2623, 2789, 3089, 3196, 3623, 4055, 4086, 4183, 4668, 4830, 5494. **154**: 433, 1362, 1589, 1684, 1685, 1841, 2012, 2150, 3061, 3531, 4504, 4751, 5247, 5620, 5902, 1817, 1973, 5676, 1861. **155**: 34, 425, 1530, 1927, 2418, 2651, 4309, 4525, 4566, 4731, 4954, 5028.1, 5317, 5523 **156**: 853, 1189, 1452, 1938, 2749, 3117, 3440, 3479, 4146, 4189, 4237, 4446, 4494, 4564, 4565, 4934, 5473, 5512, 5655, 5831, 5973, 6017, 2226, 3876. **157**: 𝔅912, 884, 1061, 1310, 1384, 3086, 3282, 3840, 4057, 5139, 5187, 5217, 5525, 5971, 5999. **158**: 362, 1435, 1464, 1585, 1696, 3491, 3980, 4310, 4750, 4785, 5302, 6046. **159**: 577, 819, 1363, 2013, 2654, 3104, 3516, 4142, 4367.1, 4811, 5081, 5650, 5909, 296, 1032. **160**: 𝔅85, 𝔅1080, 𝔅1127, 𝔅1132, 𝔅1395, 𝔅1612, 𝔅1947, 𝔅3302, 36, 309, 637, 1508, 1786, 3025, 3068, 3111, 3186, 3203, 3578, 3646, 4029, 4075, 4201, 4311, 4331, 4367.2, 4562, 4867, 5568, 5575, 5906, 5950, 5960, 5977, 6000, 6088, 5103, 2691, 3379, 5491. **161**: 64.1, 308, 777, 900, 1129, 1424, 1460, 1579, 2209, 2265, 2321, 2370, 2428, 2790, 4071, 4244, 4351, 4456, 4478, 4596, 4705, 5457, 5477, 6059, 3880. **162**: 𝔅980, 𝔅2992, 499, 923, 1142, 1881, 2080, 2700, 3205, 3433, 3439, 3843, 4553, 4610, 4678, 4745, 4995, 5238, 5421, 5726, 2675, 5404. **163**: 82, 1784, 1785, 1838, 2313, 2698, 2729, 3103, 3118, 3553, 3919, 4222, 4656, 4751, 5251, 6068, 5100. **164**: 868, 1240, 1528, 2010, 2141, 3177, 3487, 4037, 4185.1, 4747, 4773, 5086, 5186, 5213, 5514, 5874, 6084, 1816, 𝔅480, 1034, 5573, 5613. **165**: 𝔅81, 𝔅735, 𝔅926, 353, 434, 1141, 1364, 1404, 1425, 1717, 1849, 1998, 2260, 2540, 2621, 3142, 3288, 3560, 3885, 4164, 4240, 4303, 4714, 4803, 5240, 5426, 5867, 5932, 6021, 5796. **166**: 1505, 1815, 3148, 3632, 4365, 5212, 5927, 1751. **167**: 𝔅292, 𝔅3146, 1913, 2019, 2106, 2193, 2603, 4481, 5498, 5542, 5577, 𝔅2980, 1864, 4716, 5901. **168**: 𝔅1221, 𝔅2949, 1115, 1485, 1675, 1675.1, 2372, 2657, 2828, 3093, 3486, 4496, 5329, 5561, 1143. **169**: 𝔅774, 1290, 1605, 1797, 1914, 2188, 2549, 3605, 3609, 4028, 4474, 5081, 5144, 5540, 6127. **170**: 𝔅175, 𝔅248, 𝔅288, 𝔅359, 𝔅929, 𝔅1079, 𝔅1220, 𝔅1610, 436, 639, 776, 1200, 1239, 1446, 1486, 1977, 2467, 3141, 3521, 3533, 3612, 3954, 4646, 4653, 4667, 4767, 4943, 5171, 5172, 5196, 5330, 5659, 5790, 5818, 6022, 6042, 1416, 2079. **171**: 297, 438, 523, 1583, 2489, 2755, 3488, 3647, 4188, 4255, 4574, 4872, 5352, 5651, 5718, 5798, 6032, 1256. **172**: 2235, 2609, 4230, 4809, 5469, 5648, 5652, 5668, 1273, 5508, 5578, 2604, 𝔅226, 2544. **173**: 76, 3232, 4143, 4190, 4291, 6030, 𝔅3011, 5271. **174**: 𝔅1219, 1394, 1671, 1776, 1840, 2075, 2213, 3707, 3845, 4127, 4182, 4198, 5180, 5207, 5298. **175**: 𝔅88, 𝔅678, 𝔅1198, 𝔅1209, 𝔅1313, 𝔅1618, 501, 903, 2210, 2266, 2378, 2476, 3206, 3409, 3527, 3625, 3830, 4356, 4368.9, 4369.1, 4534, 4546, 4820, 4829, 4873, 5082.2, 5489, 5511, 5562, 5657, 5704, 5747, 5797. **176**: 650, 2369, 3106, 3376, 3511, 3842, 5242, 5267, 5744, 5912, 1981, 2587. **177**: 𝔅1346, 1836, 2659, 2752, 5572, 5777, 5291, 6139, 2611. **178**: 𝔅164, 200, 1124, 1148, 1285, 1577, 1911, 2605, 3514, 3541, 3832, 4027, 4265, 5269, 5278, 5535, 5547, 5645, 5711, 5783, 5785, 6104, 1953, 5724. **179**: 549, 567, 1835, 2660, 3846, 4656.1, 4877, 4940, 4956, 5826, 6125. **180**: 𝔅504, 𝔅544, 𝔅565, 𝔅645, 𝔅906, 𝔅916, 𝔅950, 𝔅1126, 𝔅1166, 𝔅1195, 𝔅1554, 𝔅3143, 𝔅3288, 703, 1198, 2260.1, 2422.2, 2512, 3023, 3378, 3386, 3896, 4215, 4717, 5314, 5549, 5658, 5660, 5666, 5945, 6076. **181**: 1188, 2433, 2185, 2599, 3105, 3181, 4014, 4554, 4614, 5320, 5395, 5519, 5546, 5581, 5885, 6137, 2534, 5245. **182**: 𝔅519, 𝔅1182, 58, 503, 1879, 3495, 3579, 3837, 4878, 5042, 5090, 5530, 5649, 5946, 5949, 6131. **183**: 71, 2132, 2547, 2606, 3430, 5248, 5430, 5627, 5905, 5928, 6175, 1974. **184**: 𝔅849, 679.1, 767, 1182, 1448, 2546, 2794, 4556, 4929, 5803, 6082, 2616. **185**: 𝔅370, 92, 629, 1586, 1661, 1882, 1915, 2426, 3108, 4030, 4134, 4825, 5107, 5137, 5463, 5559, 5631, 5998, 6002, 6029, 1266. **186**: 𝔅397, 𝔅3304, 550, 1777, 2184, 2526, 2990, 3626, 3644, 4396, 5889, 6050, 6122, 1975, 5175. **187**: 94, 840, 1781, 2076, 2270, 2374, 3869, 4428, 4711, 5109, 5228, 5925, 6018, 6085, 3111, 3483, 4598, 5742, 5493. **188**: 𝔅923, 𝔅1201, 1120, 1284, 1359, 1750, 2186, 2417, 4111, 4198, 4911, 5232, 5591, 5778, 5784, 6119, 1820, 299. **189**: 147, 3049, 3064, 3526, 3698, 4424, 4501, 5046, 5331, 5428, 5467, 5516, 5564, 5788, 5793, 5898, 3407, 3582. **190**: 𝔅256, 𝔅639, 𝔅720, 𝔅721, 𝔅1589, 𝔅1604, 𝔅3023, 𝔅3206, 𝔅3209, 818, 1121, 1624, 1789, 1900, 1940, 2435, 2459, 2989, 3020, 3518, 4056, 4078, 4217, 4277, 4423, 4541, 5136, 5495, 5842, 6019. **191**: 𝔅1869, 𝔅3291, 1429, 2375, 2421, 2479, 2808, 3084, 3645, 3871, 4073, 4593, 4631, 4722, 5125, 877. **192**: 𝔅850, 707, 2630, 5234, 5299, 5792, 5931, 6138, 5106. **193**: 𝔅930, 251, 265, 768, 944, 988.1, 1060, 1892, 3042, 4107, 4202, 4875, 5268, 5303, 5435, 6038, 5563. **194**: 𝔅1649, 𝔅1797, 𝔅1895, 1779, 2373.1, 3375, 3476, 4430, 4659, 4679, 4821, 5226, 5337, 5413, 6070. **195**: 𝔅1180, 𝔅1555, 𝔅3234, 709, 876, 2917, 3088, 3162, 3384, 3445, 4357, 4421, 4526, 4535, 4633, 5050, 5113, 5276, 5626, 5844, 5929, 5957, 6003, 6049, 6067, 6135, 𝔅3298. **196**: 1780, 3873, 4221, 5189, 4136, 𝔅1137, 𝔅1253, 535, 2287, 2528, 3051, 4463, 5420. **198**: 𝔅134, 976, 994.1, 1459, 1472, 1778, 1884, 2225, 3293, 3446, 3770, 4193, 5315, 5372, 5839, 5921, 5265, 6116. **199**: 𝔅686, 𝔅1194, 𝔅1218, 2020, 2376, 4059, 4601, 5419, 5424, 5624, 5681, 5698. **200**: 𝔅185, 𝔅915, 𝔅958, 𝔅984, 𝔅1192, 𝔅1237, 𝔅1605, 𝔅1860, 280, 461, 1228, 2018, 2022, 2026, 2550, 2923, 3039, 3067, 4367.5, 4669, 4694, 4706, 4937, 5312, 5458, 5476, 5510, 5566, 5580, 5623, 5782, 5989, 6061, 6120, 6129. **201**: 𝔅1196, 1775, 1834, 2438, 2554, 3040, 5326, 5614, 2014, 1983, 4547, 4394. **202**: 901, 1402, 1837, 2465, 3868, 4944, 5211, 5425, 5447, 6141. **203**: 1787, 2260.2, 2631, 2655, 3046, 3385, 4810, 4932, 5273, 5304, 6066. **204**: 2016, 2460, 3529, 3530, 4555, 4600, 4612, 4905, 5127, 5433, 5496, 6098, 1819, 6073, 4948. **205**: 𝔅169, 𝔅772, 𝔅1125, 𝔅3211, 𝔅3290, 599, 1839, 3554, 3635, 3866, 4231, 4368.1, 4487, 4719, 4938, 5036, 5270, 5274, 5328, 5594, 5821, 5884, 6039. **206**: 𝔅716, 𝔅2937, 640, 676, 1405, 1584, 2017, 3085, 4191, 4489, 4871, 4936.1, 5294, 5296, 5586, 5727, 5737, 5838, 5849, 6071. **207**: 207, 2610, 2628, 3271, 4597, 4622, 4682, 4898, 5048, 5305, ..396, 5529, 5892, 𝔅3293, 1722, 5443. **208**: 𝔅1188, 440, 977, 2608, 3083, 4611, 4680, 5091, 5214, 5327, 5733, 5786, 6004, 6108, 𝔅3024, 3901, 4619, 5035, 5887. **210**: 𝔅118, 𝔅1184, 𝔅2707, 𝔅2948, 𝔅3303, 174, 486, 704, 1337, 2323, 3094, 3828, 4083, 4145, 4397, 4464, 4471, 5197, 5289, 5351, 5434, 5441, 5446, 5528, 5865, 5953, 5958, 3900, 4341, 𝔅770. **211**: 𝔅1677, 544, 2945, 3033, 4604, 5082.1, 6034, 6102. **212**: 𝔅685, 𝔅1217, 𝔅3232, 1373, 2259, 3294, 3693, 3909, 4290, 4621, 4990, 5131, 5588, 5706, 5743, 6099, 6159. **213**: 𝔅1208, 𝔅3213, 𝔅3326, 1866, 2015, 2733, 2947, 3556, 3964, 4295, 5509, 5707, 5969 **214**: 𝔅89, 𝔅1189, 𝔅1624, 1801, 2274, 2437, 2557, 5316, 5809, 2243, 5641. **215**: 𝔅775, 𝔅990, 𝔅1216, 𝔅3103, 1281, 1609, 2377, 2624, 2625, 2747, 2806, 3673, 4232, 5680, 5871, 6023, 6079, 6153, 𝔅490. **216**: 3021, 3438, 3517, 3910, 4114, 4663, 4684, 5683, 5699, 5775, 5970. **217**: 𝔅2529, 𝔅3301, 435, 831, 854, 1062, 2436, 2798, 2946, 4254, 4881, 5132, 5629, 6037, 6087, 6163, 1976. **218**: 𝔅320, 𝔅1105, 𝔅1186, 3047, 3405, 4444, 4649, 4879, 5209, 5452, 5503, 5590, 5647, 5705, 5836. **219**: 𝔅2527, 1421, 4031, 4457, 4625, 5536, 6170. **220**: 𝔅153, 𝔅968, 𝔅1028, 𝔅1205, 𝔅1213, 𝔅1215, 𝔅2726, 354, 1288, 1426, 1531, 1623, 1848, 1906, 2023, 2101, 2440, 2551, 3402, 4170, 4606, 4673, 4718, 4775, 4864, 4957, 5082.3, 6142. **221**: 𝔅959, 𝔅1803, 2732, 3773, 4316, 4617, 5544, 5883, 𝔅1490, 1126, 2429, 4252, 5191, 5290, 5979. **223**: 1070.1, 5040, 5080, 6032.1, 𝔅2686, 554, 1680, 2273, 3041. **225**: 𝔅317, 𝔅928, 𝔅3210, 𝔅3214, 1114, 3202, 4081, 4530, 4691, 4840, 4944.1, 5181, 5398, 5487, 5684, 5888, 𝔅516. **226**: 𝔅517, 74, 708, 1110, 1903, 3097, 3432, 5079, 5630, 5987. **227**: 𝔅2762, 317, 2021, 2450, 3017, 3538, 4483, 5192, 5780, 𝔅638. **228**: 𝔅1190, 𝔅1212, 1896, 1909, 2244, 2482, 2566.2, 3234, 3610, 4685, 5182, 5297, 5439, 5926, 6052, 6148, 1474, 1493, 4876, 6083. **230**: 𝔅165, 𝔅299, 𝔅316, 𝔅895, 𝔅1060, 𝔅3296, 527, 878, 1800, 1828, 1912, 2430, 2754, 3443, 3853, 4613, 4890, 5462, 5468, 5654, 5685, 5736, 5791, 6092. **231**: 59, 3555, 4768, 5062, 𝔅1680, 1139, 1140, 1345, 4599, 5636, 5661, 5910, 5956. **233**: 𝔅424, 241, 1492, 4016, 4194, 5056, 5703, 5713, 1670, 3552, 3557, 4312, 4945, 5914, 5986. **235**: 𝔅1211, 𝔅2502, 𝔅2763, 𝔅3299, 260, 610, 1076, 1598, 1782, 1908, 2449, 3270, 3444, 4085, 4500, 5089, 5333, 6001, 6053, 6124. **236**: 𝔅1214, 𝔅2608, 4657, 5552, 5599, 5907, 𝔅804, 𝔅894, 𝔅1200, 1075, 1902, 2701, 3451, 3743, 4224, 4499, 4660, 4712, 5293, 5716, 𝔅254, 5041. **238**: 𝔅758, 1338, 2107, 2439, 3043, 3150, 4151, 4524, 1696, 4812, 4910, 5994, 6168, 2245, 2186, 4256, 5227, 5663 **240**: 𝔅1033, 𝔅1804, 839, 1399, 1578, 3050, 3066, 3204, 3723, 1129, 4608, 4664, 4666, 5033, 5272, 5455, 5776, 5914, 5982, 5983 **241**: 3274, 3613, 4035, 4294, 5416, 5900, 1862, 𝔅2984, 494, 5151, 5600, 5669, 6115, 1899, 706, 1514, 4084, 5190. **244**: 2183, 1616, 5259, 6077, 1211, 𝔅184, 𝔅1187, 565, 2443, 3185, 5474, 5632, 5804, 5896. **246**: 493, 705, 3298, 3636, 4022, 5060, 𝔅487, 1679, 3106, 5203, 5343, 5822. **248**: 𝔅1674, 𝔅2674, 𝔅3297, 904.3, 1901, 3572, 5670, 6143, 3182. **250**: 𝔅380, 𝔅884, 𝔅916 1, 𝔅1130, 𝔅1202, 𝔅1207, 𝔅1210, 𝔅1711, 𝔅3059, 𝔅3102, 541, 2122, 2446, 2477, 2627, 3109, 3965, 4040, 4181, 4569, 4715, 4880, 4946, 5051, 5075, 5206, 5677, 5679, 5701, 5820, 6040, 6062, 5656. **251**: 𝔅2134, 1539, 1847, 4571, 5264, 𝔅1073, 𝔅2689, 𝔅1199, 𝔅2935, 3110, 3720, 4364, 4683, 4693, 5709, 6006. **253**: 𝔅2754, 1093, 1374, 1529, 5047, 5964, 𝔅173, 𝔅1129, 1146, 1771, 3478, 6089, 6158 **255**: 𝔅2621, 557, 1408, 2422.1, 2444, 4618, 4926, 6161, 𝔅872, 𝔅1203, 547, 995, 1523, 2658, 3018, 4527, 4638, 4642, 4737, 4931. **257**: 2420, 2792, 3292, 4502, 5807, 6117, 609.1, 1625, 1904, 3512, 1124, 5045, 5277. **259**: 𝔅93, 𝔅898, 𝔅1204, 1920, 3381, 5567, 𝔅891, 𝔅1486, 𝔅3311, 682, 1575, 3946, 4315, 4822, 4869, 5300, 5323, 5338, 5702, 5843, 5895, 6172. **261**: 2451, 5460, 5504, 5696, 4167, 4634, 4933, 5972, 3452, 3862, 5324, 5488, 5506, 5442. **265**: 𝔅1896, 875, 2552, 3209, 5322, 5517, 5913, 𝔅1193, 1883, 2791, 4602, 4690, 4909. **268**: 4251, 4963, 5642, 6037, 3280, 3434. **270**: 𝔅722, 𝔅904.1, 𝔅982, 𝔅1173, 𝔅2761, 679, 2145, 2817, 3019, 3382, 3796, 4197, 4674, 5401, 5518. **271**: 𝔅2704, 4949, 5513, 2151, 4246, 4629, 5295, 5911, 6154, 𝔅3282. **273**: 𝔅1475, 1068, 2521, 4884, 5513, 5537, 5866. **275**: 𝔅1675, 𝔅1729, 𝔅2687, 532, 1708, 3480, 4025, 4874, 4882, 5032, 5556, 5619, 6155. **276**: 𝔅221, 𝔅1678, 𝔅883, 𝔅1679, 𝔅1191, 3691, 4314, 6097, 2690. **280**: 𝔅91, 𝔅642, 𝔅828, 𝔅1880, 𝔅2532, 𝔅2906, 𝔅3193, 1380, 1707, 2102, 2108, 3721, 4036, 4628, 4870, 5307. **282**: 𝔅1312, 1603, 6036, 3208, 3484, 𝔅2115, 4488. **285**: 766, 1521, 2620, 1620, 4662, 4862, 4888, 5585, 5863, 5936. **286**: 1471 1, 1191, 3052, 1182, 5448, 5464, 𝔅319, 573, 𝔅2971, 1455, 1494, 1773, 2488, 4861, 4060, 4615, 𝔅1128. **290**: 𝔅223, 𝔅228, 𝔅896, 𝔅954, 𝔅2590, 1109, 1706, 2158, 3090, 3294.1, 4626, 4689, 5672, 5748, 5811, 6055, 1059. **292**: 𝔅283, 𝔅2983, 3481, 4630, 1113, 2793, 1860, 185, 552, 780, 1705, 2823, 3053, 3222, 3848. **297**: 𝔅2958, 5318, 𝔅225, 1069, 1980, 5806, 2152. **300**: 𝔅25, 𝔅229, 𝔅272, 𝔅519, 𝔅550, 𝔅691, 𝔅794, 𝔅823, 𝔅1056, 𝔅1749, 𝔅1915, 𝔅2682, 𝔅2706, 𝔅3194, 𝔅3195, 1106, 1407, 2442, 4887, 5023, 5502, 5550, 5686, 5721, 5834, 5943, 5981. **302**: 𝔅882, 4624, 4613, 5061, 𝔅1879, 1289, 4863, 1107, 1475, 2487, 5882, 𝔅271, 5976, 𝔅1993, 𝔅2705, 5817. **310**: 𝔅227, 𝔅1818, 𝔅3221, 1385, 4185, 4253, 4635, 4889, 5975, 𝔅2952, 4886. **315**: 𝔅617, 𝔅3309, 1069.1, 6133, 6164, 1346, 4891, 𝔅2668. **320**: 𝔅315, 𝔅495, 𝔅1111, 𝔅2815, 1427, 2702, 3586, 4665, 4885, 5030. **321**: 𝔅1474, 𝔅2170, 1905, 2447, 𝔅2756, 𝔅1746, 6060. **330**: 2480, 4594, 4595, 4627, 4636, 5022, 5029, 5722, 5082, 𝔅715, 888, 2153, 𝔅711, 𝔅2960, 564. **340**: 𝔅66, 𝔅710, 𝔅869, 2157, 2703, 4661, 4686, 5024, 5031. **350**: 𝔅561, 𝔅844, 𝔅1245, 𝔅2790, 𝔅3106, 1112, 3022, 5819, 𝔅684, 4438, 𝔅3359. 𝔅182, 𝔅3051. **360**: 𝔅1859, 4883, 5695, 𝔅749, 879, 𝔅1836, 𝔅2922, 𝔅2925, 1411, 𝔅543. **380**: 𝔅92, 𝔅2917, 2704, 𝔅2679, 𝔅1785, 𝔅832, 𝔅2623, 2155, 𝔅2811, 5028, 𝔅752, 𝔅3101. **400**: 𝔅657, 𝔅2923, 𝔅2939, 𝔅2959, 𝔅3015, 𝔅3190, 𝔅3279, 1409, 2156, 𝔅548, 𝔅2446, 2154, 𝔅713, 𝔅2503, 𝔅3310, 𝔅310, 199 **420**: 𝔅3289, 𝔅939, 𝔅3238, 𝔅1777, 𝔅696, 𝔅3202, 𝔅1062, 𝔅1837, 𝔅742, 𝔅1058, 𝔅322, 𝔅703, 𝔅2103, 𝔅3022, 𝔅3237, 𝔅1075, 𝔅2685, 𝔅753, 𝔅2615, 𝔅704. **450**: 𝔅82, 𝔅2602, 𝔅1779, 𝔅867, 𝔅1059, 𝔅2947, 𝔅700, 𝔅3300, 𝔅2744, 𝔅562, 𝔅2933, 𝔅1140, 𝔅1835, 𝔅1036. **480**: 𝔅1757, 𝔅1086, 𝔅2675, 𝔅1061, 𝔅2104, 𝔅948, 𝔅940. **500**: 𝔅94, 𝔅529, 𝔅616, 𝔅1244, 𝔅1710, 𝔅3130, 𝔅699, 𝔅2505, 𝔅2105, 𝔅174, 𝔅3175, 𝔅535, 𝔅300, 𝔅2610. **550**: 𝔅296, 𝔅859, 𝔅2788, 𝔅1064, 𝔅3117, 𝔅2928, 𝔅2257, 𝔅2836, 𝔅2773, 𝔅193, 𝔅1778, 𝔅825, 𝔅880, 𝔅2458, 𝔅328. **575**: 𝔅2244, 𝔅1163, 𝔅2929, 𝔅829, 𝔅1088, 𝔅2077, 𝔅303, 𝔅2531, 𝔅3168. **600**: 𝔅861, 𝔅3280, 𝔅542, 𝔅3006, 𝔅302, 𝔅951, 𝔅2973, 𝔅301, 𝔅2821, 𝔅2605, 𝔅2711, 𝔅2634, 𝔅3292. **625**: 𝔅326, 𝔅2063, 𝔅304, 𝔅1984, 𝔅707, 𝔅3287, 𝔅2373, 𝔅3167, 𝔅3205, 𝔅2442, 𝔅881, 𝔅3284. **650**: 𝔅1268, 𝔅1963, 𝔅2680, 𝔅1068, 𝔅2841, 𝔅279, 𝔅2911. **675**: 𝔅2233, 𝔅2496, 𝔅2080, 𝔅2601, 𝔅2831, 𝔅3200, 𝔅2833, 𝔅324, 𝔅2039, 𝔅1017, 𝔅2820, 𝔅536, 𝔅2824. **700**: 𝔅1275, 𝔅2136, 𝔅2822, 𝔅2832, 𝔅2829, 𝔅327, 𝔅2131, 𝔅2162, 𝔅3197, 𝔅665, 𝔅2908, 𝔅1773. **725**: 𝔅2599, 𝔅2924, 𝔅2238, 𝔅757, 𝔅2513, 𝔅2909, 𝔅2847, 𝔅664. **750**: 𝔅2907, 𝔅3158, 𝔅2677, 𝔅3172, 𝔅692, 𝔅1154, 𝔅3196, 𝔅2239, 𝔅663, 𝔅2921, 𝔅1873, 𝔅788, 𝔅2236, 𝔅1153, 𝔅2926. **775**: 𝔅1042, 𝔅2748, 𝔅503, 𝔅2849, 𝔅2024, 𝔅3161, 𝔅1543, 𝔅1775, 𝔅1642, 𝔅1541. **800**: 𝔅567, 𝔅810, 𝔅1247, 𝔅1440, 𝔅1744, 𝔅2837, 𝔅3171, 𝔅576, 𝔅2671, 𝔅2965, 𝔅2974, 𝔅2893, 𝔅2008, 𝔅307, 𝔅669, 𝔅3349, 𝔅568. **825**: 𝔅1066, 𝔅1004, 𝔅1018, 𝔅2628, 𝔅3224, 𝔅2654, 𝔅1631, 𝔅2509, 𝔅1979, 𝔅1087, 𝔅1772. **850**: 𝔅1041, 𝔅528, 𝔅1265, 𝔅2745, 𝔅309, 𝔅572, 𝔅2616, 𝔅501, 𝔅579, 𝔅2584, 𝔅2838, 𝔅2604, 𝔅747, 𝔅3131, 𝔅2438, 𝔅2777. **875**: 𝔅1838, 𝔅1839, 𝔅1243, 𝔅499, 𝔅1070, 𝔅2918, 𝔅2692, 𝔅524, 𝔅2975. **900**: 𝔅780, 𝔅857, 𝔅2253, 𝔅2656, 𝔅1959, 𝔅937, 𝔅560, 𝔅3115, 𝔅3116, 𝔅2487, 𝔅1939, 𝔅571, 𝔅3129. **950**: 𝔅1246, 𝔅1669, 𝔅1774, 𝔅1072, 𝔅2161, 𝔅2141, 𝔅2500, 𝔅2846, 𝔅1564, 𝔅2002.1, 𝔅2262, 𝔅3100, 𝔅3013, 𝔅557, 𝔅2670, 𝔅3017, 𝔅570, 𝔅3267, 𝔅2716, 𝔅1385, 𝔅1567. **1000**: 𝔅836, 𝔅2598, 𝔅2852, 𝔅2588, 𝔅2507, 𝔅3305, 𝔅569, 𝔅789, 𝔅1384, 𝔅2645, 𝔅3132, 𝔅1862, 𝔅843, 𝔅3014, 𝔅577. **1050**: 𝔅2863, 𝔅2587, 𝔅3215, 𝔅558, 𝔅2938, 𝔅1668, 𝔅2776, 𝔅2003, 𝔅2967. **1100**: 𝔅824, 𝔅956, 𝔅1223, 𝔅1593, 𝔅1870, 𝔅2360, 𝔅2379, 𝔅2486, 𝔅2865, 𝔅2174, 𝔅1374, 𝔅1561, 𝔅970, 𝔅552, 𝔅1694, 𝔅957, 𝔅2488, 𝔅587, 𝔅2334. **1150**: 𝔅3138, 𝔅573, 𝔅1571, 𝔅1851, 𝔅553, 𝔅1572, 𝔅3139, 𝔅2035.1, 𝔅1976,1. 𝔅1651, 𝔅2141, 𝔅2437, 𝔅1348. **1200**: 𝔅2313, 𝔅2644, 𝔅2354, 𝔅1850, 𝔅2263, 𝔅765, 𝔅876, 𝔅877, 𝔅3283, 𝔅1407, 𝔅2646, 𝔅2275, 𝔅1317, 𝔅1518, 𝔅1314, 𝔅2499, 𝔅1372. **1300**: 𝔅1319, 𝔅2380, 𝔅1519, 𝔅1581, 𝔅2589, 𝔅1316, 𝔅2597, 𝔅1318, 𝔅1978, 𝔅1520, 𝔅1845, 𝔅2712, 𝔅2966, 𝔅947, 𝔅1957.1. **1351**: 𝔅1846, 𝔅2235, 𝔅2431, 𝔅2663, 𝔅2659, 𝔅2427, 𝔅1517, 𝔅2130. **1400**: 𝔅2660, 𝔅1325, 𝔅2125, 𝔅1333, 𝔅2559, 𝔅2355, 𝔅811, 𝔅2248, 𝔅2561, 𝔅2394, 𝔅1424, 𝔅2430, 𝔅1801, 𝔅1671, 𝔅2323, 𝔅2426. **1500**: 𝔅858, 𝔅812, 𝔅1795, 𝔅2860, 𝔅2274, 𝔅2392, 𝔅1337, 𝔅2270, 𝔅2315, 𝔅1406, 𝔅2404, 𝔅2400, 𝔅2175, 𝔅1334, 𝔅2451, 𝔅2472, 𝔅2521, 𝔅2538, 𝔅2410. **1600**: 𝔅2391, 𝔅2557, 𝔅2267, 𝔅2273, 𝔅447, 𝔅1258, 𝔅2850, 𝔅1621, 𝔅343, 𝔅2266, 𝔅2537. **1700**: 𝔅2600, 𝔅340, 𝔅2393, 𝔅2544, 𝔅2328. **1800**: 𝔅1904, 𝔅1393, 𝔅755, 𝔅1619, 𝔅2177. **1900**: 𝔅1590, 𝔅2494, 𝔅1743, 𝔅1977, 𝔅1763, 𝔅1858, 𝔅2318, 𝔅2222, 𝔅1877. **2200**: 𝔅2109, 𝔅1724, 𝔅2283, 𝔅1821, 𝔅1663. **2400**: 𝔅1725, 𝔅2100, 𝔅1945, 𝔅2434, 𝔅1662, 𝔅483, 𝔅2232. **2700**: 𝔅473, 𝔅1689, 𝔅1767, 𝔅2090, 𝔅2128, 𝔅456, 𝔅1690. **3000**: 𝔅461.

II. BOILING POINTS

−192: 𝔅337, 54, 𝔅95, 𝔅345, 180, 𝔅1813. **−95**: 𝔅204, 𝔅465, 𝔅97, 252, 𝔅195, 𝔅9, 115, 𝔅351, 44. **−75**: 𝔅205, 𝔅17, 𝔅350, 𝔅126, 𝔅41, 𝔅125, 145, 𝔅263, 𝔅265, 𝔅485.5, 112. **−48:** 17.1, 409, 500, 𝔅68, 𝔅67, 𝔅206, 𝔅73, 𝔅26, 𝔅87, 408, 𝔅102, 232, 337. **−30:** 𝔅53, 𝔅364, 338, 263, 41, 31, 35, 95. **−18:** 686, 𝔅282, 𝔅349, 𝔅346, 13, 153, 73, 49, 781.2. **−10:** 𝔅38, 𝔅213, 65, 684, 𝔅130, 596, 𝔅141, 99, 𝔅84. **0.6:** 781.1, 685, 𝔅371, 64, 474, 𝔅98, 526, 40. **5:** 𝔅131, 687, 𝔅339, 310, 282, 63, 508, 𝔅365, 9, 1074 **10:** 𝔅40, 209, 224, 𝔅1814, 683, 42, 7, 𝔅149, 148, 283, 𝔅1811, 243, 598, 595, 𝔅4, 𝔅1672. **20.1:** 985, 208, 162, 52, 980, 𝔅96, 374, 1.1, 294, 295, 22, 1072, 597, 𝔅166, 921. **31:** 𝔅104, 569, 213, 𝔅142, 113, 983, 𝔅366, 525, 916, 615, 793, 273. **35:** 𝔅1646, 716, 278, 279, 373, 272, 1073, 982, 469, 𝔅105, 220, 986, 794, 613. **40:** 920, 28, 984, 539, 915, 530, 981, 1611, 286, 𝔅101, 313, 880, 45, 172, 913, 823. **44:** 402, 513, 918, 𝔅39, 375, 190, 𝔅797, 461, 715, 468. **47:** 𝔅99, 𝔅1149, 132, 365, 524, 447, 979, 1716. **50:** 881, 146, 749, 914, 𝔅1509, 154, 356, 520. **53:** 𝔅347, 479, 276, 529, 1050, 1087, 451. **55:** 218, 164, 237, 824, 917, 448, 𝔅111. **57:** 489, 452, 189, 𝔅352, 1712, 𝔅55, 1618, 228, 169, 465. **60:** 397, 519, 1534, 1715, 364, 133, 318, 718, 19, 1086, 3, 586 **62:** 27, 612, 1049, 357, 822, 89, 301, 1714, 3776, 1610, 891, 801, 4, 60 **65:** 50, 323, 800, 1616, 𝔅372, 517, 773, 813, 1613, 1001. **68:** 287, 518, 748, 821, 1742, 747, 1713, 𝔅59, 1533, 420. **70:** 2277, 1617, 1088, 464, 366, 728, 155, 1532, 𝔅469, 234, 112.1, 1615, 1619, 744, 𝔅207, 10. **74:** 231, 158, 𝔅42, 772, 1003, 118, 717, 83, 323.1, 820, 1048, 149, 12, 725. **78:** 𝔅513, 746, 1102, 262, 1468, 𝔅1515, 2394, 𝔅58, 332, 396, 719, 1365, 726. **80:** 𝔅348, 𝔅376, 165, 378, 752, 925, 1738, 2333, 624, 1466, 1469, 531, 2393. **81:** 130, 758, 727, 1612, 𝔅8, 168, 277, 1535, 506, 792. **83:** 623, 1252, 1537, 190, 2387, 47, 1536, 1761, 2325, 1632, 798, 117. **85:** 576, 812, 825, 1366, 1470, 1045, 𝔅109, 1328, 𝔅468. **87:** 222, 417, 669, 1008, 2388, 𝔅1810, 77, 106, 625, 811, 759, 1739, 247, 1253. **89:** 226, 1021, 1091, 1741, 462, 476, 1547, 1764, 458, 2390, 134, 𝔅1815. **91:** 670, 1101, 1740, 743, 1737, 742, 814, 17.4, 68, 122, 290.1, 652, 2391, 1002, 1019. **93:** 171, 210, 332.1, 837, 1007, 1065, 2276, 2392, 1496, 1631, 1544. **95:** 383, 1100, 2334, 𝔅390, 𝔅918, 418, 𝔅34, 𝔅35, 446, 1015, 395, 505, 2331, 26. **98:** 161, 203, 751, 810, 2326, 107, 1016, 2389, 173, 2329. **99:** 643, 1064, 2332, 1017, 1044, 791, 938. **100:** 𝔅1, 𝔅72, 𝔅455, 𝔅2010, 𝔅2044, 33, 195, 1261, 1418, 1690, 4013, 4333, 37, 2330. **101:** 642, 302, 741, 1020, 1005, 1006, 1081, 48. **102:** 496, 651, 1656, 1746, 2281, 1018, 475, 2866. **103:** 390, 2284, 2328, 391, 233, 1004, 181, 𝔅377, 614, 1099, 121, 85. **105:** 𝔅128, 𝔅530, 𝔅870, 135, 937, 1046, 1047, 2283, 1043, 1054. **106:** 𝔅215, 192, 588, 2240, 2278, 1630, 254, 1014, 2943, 568, 1699, 2279, 𝔅210, 790. **108:** 108, 137, 166, 668, 695, 816, 2238, 965, 735, 1042, 2933, 2935. **110:** 𝔅619, 𝔅1822, 183, 284, 522, 2510, 2239, 123, 𝔅467, 495, 2112, 2275, 1760, 2944. **111:** 2282, 1660, 1655, 1629, 2413, 1694, 1653, 11, 967, 1650, 2280, 𝔅103, 𝔅382, 159, 100. **114:** 714, 1082, 1085, 2057, 2241, 2934, 2938, 𝔅488, 414, 1637, 999, 242. **115:** 239, 355, 663, 1193, 2942.1, 870, 908, 1080. **116:** 𝔅37, 67, 110, 205, 590, 660, 2058, 2937, 587, 998, 926, 2936, 1658, 334. **117:** 300, 379, 2059, 2414, 2871, 756, 789, 1640. **118:** 𝔅233, 𝔅798, 𝔅1714, 274, 563, 667, 307, 711, 1084.1, 1097, 2111, 2940, 4386, 212, 2327, 1652, 2942. **119:** 177, 533, 1639, 1700, 2194, 2382, 895, 1084. **120:** 𝔅1825, 347, 488, 827, 1733.1, 2452, 2891, 1755, 2873, 755, 2825, 2869, 939, 90, 2364. **121:** 377, 1011, 1635, 1733, 2237, 2975, 1654, 1634. **122:** 𝔅266, 𝔅426, 1725, 2974, 1734, 775. **123:** 387, 2874, 3048, 1659, 1649, 2345, 2868, 1763. **124:** 562, 927, 1636, 1662, 2827, 712, 713, 512, 2941, 2355. **125:** 𝔅232, 𝔅436, 236, 419, 578, 896, 1053, 2824, 2872, 17, 1026. **126:** 340, 470, 1096, 1701, 266, 1651. **127:** 𝔅250, 367, 608, 754, 1638, 1657, 91, 1040. **128:** 966, 1083, 1443, 1727, 1762, 1769, 2363, 2384, 2870, 745, 227. **129:** 1556, 1633, 1702, 973, 2867, 1098, 1546. **130:** 𝔅1893, 78, 253, 411, 970, 1212, 2397, 2796, 5350, 1648, 139, 924. **131:** 589, 1028.1, 1520, 2354.1, 1558, 1079, 384, 487, 184, 1730. **132:** 𝔅845, 404, 1691, 2359.1, 2398, 3350, 1307, 176, 3295, 3347, 𝔅1147, 2296, 471, 1695, 1732, 2826. **135:** 𝔅23, 𝔅164, 119, 571, 1548, 1723, 1726, 2357, 2795, 339, 799, 2362, 534, 2797, 3349. **136:** 38, 774, 2347, 481, 𝔅450, 𝔅1552. **137:** 𝔅360, 385, 628, 929, 1509, 1604, 2976, 3348, 1545, 1511, 2683, 𝔅218, 2686, 1078. **138:** 𝔅57, 𝔅460, 410, 817, 1510, 1730.1, 2359, 1587, 2985, 969.1, 3272. **139:** 𝔅353, 𝔅693, 992, 1557, 2685, 3297, 3351, 626. **140:** 𝔅120, 𝔅177, 𝔅378, 𝔅459, 304, 412, 635, 803, 2400, 2410, 2843, 2973. **141:** 972, 997, 1756, 2409, 2411, 450, 3353, 358. **142:** 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194: 𝔅1894, 600, 1551, 2567, 2756, 2966, 3356, 3986, 4118, 2190. **195**: 932, 1296, 2189, 2192, 2386, 2512, 2861, 2862, 3360, 3371, 3732, 3852, 3916, 3961, 109, 4156, 2191, 3189, 2568, 2569, 2590. **196**: 1200.2, 1560, 1772, 2050, 2643, 2851, 3302, 3311, 3758, 2203, 3786, 1200.3, 720, 2004, 3304. **197**: 806, 1599, 1645, 2724, 3739, 4178, 5083, 5977, 1859, 264. **198**: 331, 690, 702, 858, 2310, 3760, 3950, 4906, 2771, 2840, 3915, 936, 3277, 2496, 2309. **199**: 606, 2029, 2495, 2640, 3319, 3897, 3914, 2589. **200**: 𝔅361, 𝔅1812, 556, 591, 740, 771, 1515, 2003, 2314, 2614, 2781, 2852, 3299, 3744, 3844, 3861, 3949, 4117, 5212, 4897, 2206, 2204. **201**: 370, 3905, 3906, 2162, 2846, 𝔅491, 548, 971, 1643, 2644, 2900, 3305, 3912, 5326, 4115, 2571, 2161. **203**: 𝔅1148, 570, 1500, 3575, 2205, 2588, 368, 3982, 2383, 382, 608.2, 882, 1857, 2062, 2505, 2570, 2637, 2897, 2922, 3653, 3740, 3911, 3983, 3904. **205**: 𝔅235, 763, 1250, 1251, 1681, 1720, 1856, 2713, 3301, 3306, 3788, 3921, 4385, 4412, 2174, 2301, 1606, 3735, 2639, 3882, 2159, 3984. **206**: 729, 911, 1067, 1283, 1803, 2635, 2737, 2768, 2769, 1137, 2763. **207**: 892, 2636, 2767, 3638, 3883, 3918, 3978.1, 4122, 3637, 3881, 3972, 2710, 1644, 3341. **208**: 150, 561, 809, 1554, 2434, 2775, 3150, 3903, 3985, 4365.1, 2311, 3992, 1177, 2687, 4121, 4416, **209**: 1009, 1552, 3188, 3276, 3860, 3907, 3975, 4120, 3846. **210**: 𝔅1817, 87, 1233, 2185, 2917, 3346, 3917, 3924, 3977, 3989, 4413, 3759, 1375, 2267, 1347. **211**: 828, 2061, 2814, 2848, 3157, 3978, 4005, 2063, 2706, 3260, 120, 1234, 1089. **212**: 𝔅211, 𝔅1827, 731, 2261, 2707, 3151, 3235, 3574, 3927, 3928, 3973, 3974, 4155, 3152, 3259, 3470, 2739, 4404. **213**: 𝔅356, 473, 482, 1176, 2581, 3128, 3249, 3268, 4130, 3154, 3149, 3901. **214**: 511, 1315, 1858, 1964, 1965, 1966, 2035, 2506, 2711, 3261, 3926, 3987, 4418, 1349, 2633, 1249. **215**: 𝔅2931, 975, 1703, 1887, 2741, 2765, 3316, 3364, 3935, 3936, 3947, 2634. **216**: 760, 852, 1768, 2758, 2764, 3129, 3655, 4010, 4129, 4411, 4132, 2350, 2766, 2847, 3469, 3789, 3133, 2760. **217**: 𝔅679, 405, 1205, 1316, 1553, 2507, 2716, 2717, 2748, 2759, 2849, 3156, 3263, 3661, 4157, 860, 2632, 3923, 3494. **218**: 2292, 2575, 2705, 3132, 3834, 3855, 4011, 4366, 4367, 1934, 3265, 1918, 2812, 2819, 3081. **219**: 𝔅1796, 415, 416, 1175, 1206, 1844, 2127, 2165, 2712, 3236, 3922, 3966, 4175, 2709. **220**: 𝔅381, 𝔅800, 97, 126, 315, 316, 761, 922, 1235, 1149, 1704, 2047, 2269, 2821, 3155, 3238, 3676, 3765, 3782, 4254, 4376, 4378, 4480, 5846, 𝔅286, 1870, 2638. **221**: 𝔅268, 342, 399, 1204, 2490, 2492, 2714, 2762, 2949, 4585, 3678, 3968, 2725. **222**: 238, 372, 2081, 3134, 3262, 3267, 3967, 311, 2577, 2784, 4161, 2618, 2715, 673, 2351, 2757. **224**: 428, 987, 2216, 2257, 3219, 3763, 3856, 3859, 4176, 5608, 1327. **225**: 553, 1794, 2045, 2046, 2134, 2813, 3071, 3131, 3257, 3753, 4089, 4131, 5815, 2708, 3920, 478, 2668, 2927, 188. **226**: 2464, 2761, 2930, 3243, 3654, 3677, 3755, 4100, 4171, 4373, 4170, 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3682, 2120.1, 1090, 4088, 2671. **240**: 𝔅368, 𝔅519, 𝔅1032, 𝔅1180, 𝔅1513, 138, 1919, 1924, 2005, 2064, 2115, 2117, 2119, 2457, 2804, 3171, 3690, 3885, 4096, 4547, 5033, 5102, 𝔅1797, 1875, 3785. **241**: 2125, 2544.1, 2738, 3251, 4368.8, 2052, 1217, 1576, 1955, 2243, 2578, 3174, 3790, 4374, 3098, 4337. **243**: 1432, 1790, 2124, 2176, 2463, 2522, 2822, 2863, 3036, 3589, 4038, 4346, 5860, 3941, 1483. **244**: 1477, 3070, 4091, 2175, 3592, 1179, 𝔅2113, 104, 994, 1321, 1414, 1472, 2121, 2126, 2218, 2524, 2541, 4039, 4326, 4408, 5066, 3701. **246**: 941, 1136, 1137, 1949, 2669, 3291, 3767, 4849, 3754, 1318, 1688, 1792, 1873, 2497, 2580, 2740, 2742, 3783, 5896, 2745. **248**: 312, 802, 1811, 2472, 2787, 3590, 3884, 4092, 4098, 4968, 2007, 2244. **250**: 805, 901, 1464, 1745, 1956, 2829, 3124, 3748, 4828, 4900, 5259, 4095, 4338, 672, 2666, 3943. **251**: 1322, 1368, 1369, 2217, 3069, 3192, 4283, 5718, 4160, 883, 1320, 1479, 2172, 2646, 4856, 4979, 3548. **253**: 1178, 1291, 1793, 2849.1, 3081, 3135.1, 3666, 1236, 1135, 2504, 3328, 4339, 4827, 2788, 4140, 3199, 4219. **255**: 𝔅387, 𝔅1828, 1502, 2249, 2544.2, 3035, 3220, 3547, 3689, 3793, 3933, 4127, 4363, 3001, 3250. **256**: 350, 974, 1173, 1203, 2508, 3005, 3172, 3874, 4048, 4978, 1202, 𝔅254, 1527, 2118, 3931, 3953, 2245, 3028. **258**: 1169, 1326, 2099, 2667, 2890, 3455, 3979, 4041, 4282, 4843, 3126, 2723, 2425, 3289, 3709, 4049, 4211, 4415, 4973, 5568, 2585, 2247, 3600. **260**: 178, 565, 730, 861, 1325, 1367, 1822, 2100, 2116, 3214, 3746, 3791, 3836, 3930, 4491, 4500, 4974, 4857, 5005, 5347, 3002, 1959. **261**: 571, 1201, 4045, 4308, 𝔅253, 3004, 3546, 3587, 3593, 3833, 3835, 4345, 4490, 4567, 2801, 1247, 4832, 607. **263**: 1077, 1317, 1626, 1958, 2474, 2586, 3688, 4380, 4976, 1304, 4044, 4093, 4975, 3456, 4279. **265**: 𝔅1129, 2253, 2658, 3076, 3146, 3606, 3980, 4046, 4347, 4351, 4365, 4391, 4590, 3650, 2584, 3651. **266**: 𝔅1676, 1171, 1506, 4280, 3100, 3044, 560, 1481, 3077, 3558, 3643, 4128, 4106, 4493, 3667, 5166. **268**: 𝔅1649, 𝔅1865, 2677, 3003, 3139, 3140, 4205, 3981, 309, 2518, 4852. **270**: 𝔅2114, 𝔅2606, 502, 765, 1246, 1970, 2078, 2622, 3773, 4032, 4043, 4064, 4983, 1033, 4543, 5018, 1979. **271**: 𝔅770, 2073, 2367, 3774, 4062, 4542, 5142, 1324, 3078, 4757, 4758, 3099. **273**: 3671, 4349, 2670, 1574, 2251, 2676, 3778, 4042, 5156, 2736, 3747. **275**: 2587, 3000, 4034, 4184, 4238, 4972, 3248, 𝔅1674, 1157, 2424, 3652, 4267, 4301, 4296, 1415, 4359, 2423, 3702. **277**: 889, 1119, 2098, 4492, 4707, 5003, 5141, 4218, 1158, 1807, 3620, 3792, 4778, 3703, 2519, 2731, 3147. **280**: 769, 1255, 1581, 2207, 2250, 2616, 2729, 2850, 3130, 3507, 4173, 4278, 4327, 4368.2. **281**: 871, 4760, 3153, 1580, 3412, 3454, 3615, 4163, 4207, 4297, 4544, 4318. **283**: 2619, 2678, 3710, 4319, 2651, 4756, 2431, 1259, 1260, 2254, 2596, 2617, 2697, 3420, 3542, 4533, 5153, 4317. **286**: 1397, 2780, 3417, 3508, 4268, 4299, 1416, 1258, 897, 1480, 3183, 3290, 4269, 4508, 886, 4759, 5167, 3414. **288**: 𝔅74, 592, 1133, 3006, 4779, 1384, 3543, 3595, 4195, 4761, 5244, 1256, 3413, 3497, 5002. **290**: 𝔅46, 𝔅379, 515, 573, 1254, 2072, 2173, 2473, 2647, 3198, 3670, 3771, 4531, 4635, 4784, 4802, 5286, 5490, 5681. **291**: 𝔅255, 1926, 4047, 1245, 4023, 5169, 4532, 4996, 3642, 3692, 4050, 4260, 4845, 4513. **294**: 4322, 4381, 4997, 𝔅230, 1478, 2648, 4158, 4439, 4762, 5160, 5017. **296**: 1154, 3194, 4352, 4324, 3498, 4019, 5110, 4325, 4793, 4225, 4017, 3115, 4362, 4777, 4939, 5340, 4507, 1273, 4266, 4930. **300**: 𝔅363, 𝔅695, 1213, 1985, 2167, 2416, 3010, 3075, 3094, 3158, 3197, 3526, 3630, 3696, 4029, 4109, 4473, 4512, 4529, 4650, 4789, 4838, 4867, 4987. **301**: 1817, 3550, 5020, 3016, 1272, 1921, 3596, 4262, 4270, 4466, 4967, 3195, 3945, 5260, 2649. **304**: 𝔅883, 946, 3473, 4323, 3499, 3216, 4020, 4305, 4441, 4447. **306**: 4018, 4448, 4794, 3551, 3196, 4708, 3466, 4240, 4846, 1419, 4988. **310**: 𝔅896, 4261, 5010, 5400, 1120, 4329, 4505, 1925, 4790, 𝔅444, 4458, 4697. **315**: 𝔅1342, 𝔅1895, 1163, 1165, 1166, 1982, 4451, 4916, 4725, 4734, 4726. **317**: 𝔅66, 1573, 1981, 2462, 5391, 4442, 1271, 4204, 4917. **320**: 𝔅1804, 1149, 4212, 4263, 4715, 4791, 5816, 2844, 𝔅894, 4506, 4724, 𝔅88, 5861. **325**: 4393, 4687, 5037, 5072, 4994, 1110, 4243, 5059, 4727, 𝔅1679, 4220, 5607, 𝔅251, 1123. **330**: 𝔅2116, 831, 4431, 5074, 5486, 4792, 4914, 𝔅2115, 𝔅1678, 808, 1923. **335**: 1922, 4915, 5044, 1525, 4203, 5689, 𝔅91, 2421. **340**: 𝔅496, 𝔅1624, 1526, 4214, 4242, 4271, 4460, 5043, 5135, 5262, 4652, 𝔅2117, 4425, 4244, 4649, 4455, 4728, 5168, 5335. **345**: 2212, 5038, 4434, 𝔅1675, 4672, 4902, 5521. **350**: 4515, 5183, 5184, 5747, 4427, 4435, 4436, 𝔅898, 4285, 4211, 4465, 5520, 5402. **360**: 1991, 3042, 3307, 4137, 4622, 4676, 4912, 4913, 5193, 5491, 5746, 5616, 4287, 4892, 5281, 4012. **371**: 4215, 𝔅471, 4514, 5053, 4249, 4620, 6010, 𝔅1869, 5379, 5887, 𝔅882, 4907, 5173, 5306, 5055. **400**: 𝔅958, 𝔅1798, 𝔅2959, 4690, 𝔅292, 4286, 5395, 𝔅226, 𝔅2608, 𝔅89, 𝔅480, 5494. **421**: 𝔅92, 5883, 5274, 𝔅716, 4626, 5863, 4722, 𝔅1075, 5172, 𝔅316, 5264. **452**: 5493, 𝔅320, 4637, 4636, 5508, 𝔅1749, 𝔅170, 𝔅223. **500**: 𝔅322, 𝔅769, 5817, 𝔅224, 𝔅228, 5695, 𝔅227, 𝔅678, 𝔅271, 𝔅2105. **600**: 𝔅193, 𝔅1879, 𝔅490, 𝔅487, 𝔅753, 𝔅752, 𝔅881. **707**: 𝔅272, 𝔅832, 𝔅495, 𝔅749, 𝔅696, 𝔅700, 𝔅703, 𝔅2936. **916**: 𝔅543, 𝔅548, 𝔅529, 𝔅829, 𝔅825, 𝔅940, 𝔅779, 𝔅1268, 𝔅2613. **1230**: 𝔅499, 𝔅3283, 𝔅2610, 𝔅528, 𝔅951, 𝔅3284, 𝔅2680, 𝔅3205, 𝔅3287, 𝔅2917, 𝔅2926, 𝔅3200, 𝔅947, 𝔅2605, 𝔅939, 𝔅2924, 𝔅2668, 𝔅2677, 𝔅3197. **1400**: 𝔅2499, 𝔅3196, 𝔅2131, 𝔅2671, 𝔅2921, 𝔅2769, 𝔅2918, 𝔅1337, 𝔅1059, 𝔅1870, 𝔅1334, 𝔅2500. **1670**: 𝔅2604, 𝔅2670, 𝔅1858, 𝔅311. **3800**: 𝔅1619, 𝔅1721, 𝔅1799, 𝔅481, 𝔅1805, 𝔅1689, 𝔅1690.

III. DENSITY

A. Liquids

0.415: 54, 409, 𝔅102, 1072, 1073, 𝔅406, 1716, 1715, 980, 1713, 1714. **0.670**: 2392, 2394, 915, 916, 2387, 1610, 𝔅407, 2389, 917, 2391, 1534. **0.692**: 1613, 2933, 525, 823, 918, 1617, 22, 𝔅410, 914, 2939, 824. **0.712**: 1619, 𝔅409, 𝔅414, 822, 1535, 2331, 3354, 524, 2334, 2936, 1761, 2940, 3995. **0.724**: 2873, 𝔅425, 1764, 2279, 𝔅412, 1086, 4000, 3994, 794.1, 3999, 821, 794, 1760. **0.740**: 820, 𝔅415, 3351, 4178, 396, 𝔅416, 2985, 1741, 3993, 3957, 1101 **0.750**: 1615, 1100, 1738, 1737, 979, 1739, 2975, 4412, 3372, 4587. **0.760**: 669, 4586, 479, 2974, 4165, 2211, 2328, 2330, 2413, 1001, 4856, 𝔅418, 1099, 1762.1, 3323, 4012, 4111, 2869, 2973. **0.771**: 2868, 2987, 5018, 3365, 𝔅420, 4006, 4849, 5167, 913, 1632, 2419, 4418, 5260, 𝔅421, 1612, 2867. **0.781**: 𝔅422, 208, 𝔅423, 168, 395, 506, 3320, 1049, 262, 792, 5156. **0.790**: 3960, 3297, 5377, 60, 1003, 3961, 301, 667, 718, 448, 2825, 2284, 3812. **0.800**: 790, 1769, 2281, 972, 1603, 2827, 973, 3811, 1639, 3295, 505, 𝔅411, 2382. **0.805**: 719, 880, 1366, 1544, 2283, 2345, 447, 791, 2955, 1081, 1084, 1602, 2282. **0.810**: 789, 1537, 1084.1, 1630, 2327, 2898, 2965, 1754, 3895, 3959, 1640, 1730.1, 2320, 2347, 313, 1083, 2396, 2397, 2872. **0.817**: 717, 1078, 2403, 2897, 2960, 1005, 1085.1, 1636, 1699, 2896, 1085, 1726, 1733.1, 2407, 2407.1, 2408, 2968. **0.820**: 1728, 2399, 5169, 2892, 2970, 3827, 2967, 1725, 2400.1, 2409, 2796, 2954, 2962, 3356, 1727, 1734, 3978.1 **0.825**: 2971, 3978, 4005, 4170, 4172, 4848, 800, 2240, 2963, 2966, 2956, 3364, 1736, 2400, 3361, 4002. **0.830**: 1469, 2797, 3826, 1547, 1732, 1746, 2929, 4415, 237, 587, 3362, 925, 2410, 3326, 4179, 4836, 998, 1633, 3355, 3821. **0.835**: 1098, 1629, 2239, 810, 811, 3358, 517, 814, 837, 999, 1628, 1000, 2952, 3889, 2865, 3893. **0.840**: 273, 749, 2412, 3808, 3822, 356, 1466, 3810, 3809, 3815, 4010, 2928, 1546, 1468, 1470, 272. **0.850**: 2343, 1572, 3816, 1063, 711, 993, 2890, 3333, 3334, 446, 1048, 3823, 3824. **0.856**: 927, 3894, 3903, 5606, 1096, 2288, 3728.1, 1545, 3727, 5380, 3331, 5978. **0.860**: 469, 1054, 2834, 3333.1, 3725, 3728, 3730, 3992, 4115, 2686, 3734, 3805, 3969, 4168, 513, 3226, 3228, 3721, 4408, 3229.1. **0.863**: 1548, 2835, 2912, 3820, 4367, 2909 1, 3223, 2685, 3731, 3806, 5853, 2359.1. **0.866**: 801, 2112, 2357, 2901.1, 3729, 4175, 3225, 3726, 4365.1, 2354.1, 3229, 3740 1, 3330.1, 3807, 3899, 3988, 2359. **0.870**: 926, 1046, 1653, 4992, 5813, 2901, 748, 1649, 1652, 1655, 1064, 1695, 2855, 2903, 3891, 798, 2355, 2683, 747. **0.875**: 2354, 3915, 3230, 4576, 2356, 3987, 533, 2858, 3733, 3817, 1654, 2353, 2684, 2953, 4117. **0.880**: 1365, 5003, 1658, 3908, 3920, 1015, 1651, 3224, 4366, 1016, 1043, 1659, 3329, 4991. **0.884**: 746, 4144, 4118, 4370, 1020, 3337, 4827, 1496, 2111, 3850, 4828. **0.890**: 468, 1017, 1019, 3119, 1044, 3897, 4980, 1047, 3227, 4376, 5001, 3303, 3918, 5141, 2415, 3917, 397, 1018, 3890, 5362, 713, 725, 3974.1. **0.901**: 727, 3639, 3740, 3902, 4385, 4835, 5253, 2538, 5152, 5346, 451, 4842, 4974, 2884, 3328, 4158, 5015, 3324, 4977, 1056, 4148. **0.910**: 670, 2809, 3961, 4368.8, 908, 2888, 3913.1, 4841, 642, 2883, 2777, 3861, 1055, 2340, 4982, 5342, 5605. **0.915**: 𝔅429, 𝔅1824, 2831, 3780, 3813, 3913, 6166, 891, 2337, 3788, 4156, 726, 3369, 2298, 4578, 4972, 1557, 3923, 3924, 4388. **0.920**: 4131, 3854, 3928, 2351, 764, 2339, 2341, 3575, 938, 2290, 3341, 5482. **0.925**: 1558, 1644, 2289, 3847, 3927, 4971, 452, 937, 1647, 4130, 1643, 2882, 3258, 3926, 3935, 4975. **0.930**: 2453, 2859, 4976, 4978, 3931, 671, 4843, 965, 2830, 3936, 3735, 3764, 3789. **0.935**: 489, 799, 1519, 2861, 2201, 2810, 3922, 4157, 4981, 569, 3260, 3787, 3859, 375, 4371, 3263, 4561. **0.94**: 2979, 3790, 3882, 3883, 1010, 3259, 3947, 4990, 763, 1012, 2204, 3858, 762, 978, 2386 1, 3860, 3852, 4560. **0.945**: 909, 3857, 997, 2818, 589, 623, 3948, 724, 1541, 3214, 3267, 5005. **0.950**: 1443, 2109, 2811, 3265, 783, 924, 1478, 1444, 3319, 3762, 3865, 3904, 4132, 4326, 5940. **0.955**: 2775, 624, 1415, 2756, 4378, 752, 2335, 3765, 723, 1555, 2200, 6167 **0.960**: 3753, 1554, 307, 2763, 3204, 2914, 1553, 2722, 3121, 3655, 2778, 4080, 2365, 3246, 2840. **0.970**: 1551, 2721, 3933, 3637, 355, 2762, 4823.1, 1595, 2758, 213, 625, 2766, 3638, 4091 1. **0.976**: 929, 1511, 3752, 3856, 4967, 𝔅432, 2767, 3751 2, 5009, 3656, 1026, 2760. **0.980**: 1089, 2195, 1067.1, 2719, 870, 3654, 4314, 2761, 3878, 930, 3661, 3763, 4579. **0.985**: 4372, 4573, 2203, 3648, 935, 2718, 3662, 3761, 4941, 5000, 5688, 4342. **0.990**: 934, 1482, 4161, 681, 3235.1, 400, 450, 2757, 162, 815, 3664, 4345, 1090, 1509, 1662, 2163, 3235. **0.995**: 3311, 403, 1070, 1510, 3236, 3573, 2204, 3243, 3574, 𝔅1, 2058, 4761. **1.000**: 4095, 4097.1, 66, 3128, 4513, 5140, 5334, 258, 797, 896, 3134, 3054, 4490, 4757, 4930, 3237, 773.1, 3747, 4147. **1.010**: 594, 2713, 3132, 5110, 𝔅197, 1560, 590, 2713.1, 620, 2503, 4098, 3780, 4096, 4097, 4279, 652, 928, 2846, 2848, 2302, 2569. **1.020**: 608 1, 795, 2570, 3701, 285, 608.2, 1442, 5371, 2322, 4994, 1328, 1561, 3312, 4038, 4789. **1.026**: 2571, 3680, 4090.1, 619, 2567, 3681.1, 3684, 5010, 𝔅426, 651, 1022, 3133, 3679, 3703. **1.03**: 𝔅404, 1028, 3677, 3125, 3678, 218, 4939, 2161, 496, 2706, 3676, 2568. **1.040**: 2255, 2745, 4515, 4970, 𝔅440, 2847, 5678, 3285, 266, 274, 2001, 2159, 720, 3154, 3286, 212, 3069, 4062. **1.050**: 593, 3152, 3284, 358, 2812, 4350, 511, 4153, 2309, 4348, 2318, 2748, 3192, 3872, 4093, 4383, 2189, 3149, 399. **1.061**: 2788, 4296, 1029, 3283, 911, 4353, 616, 3135, 3191, 378, 576, 989, 1441, 3601, 3547, 2813, 176, 1606, 458. **1.071**: 2041, 2040, 3548, 3549, 1430, 2572, 3944, 807, 913, 969.1, 2310, 2590. **1.080**: 737, 1570, 2039, 3667, 2588, 449, 626, 609, 3546, 968, 621, 2008, 4726, 1572.1. **1.090**: 3649, 4102, 578, 1092, 1559, 2468, 2725, 420, 665, 2814, 3037, 2589, 1889, 3591, 1357, 1483, 3642, 3036. **1.100**: 4723, 3169.1, 4917, 471, 722, 2038, 154, 170, 1571, 4670, 247, 3688, 4368.4, 561, 1307, 2687, 1417. **1.11**: 492, 2267, 2071, 657, 233, 969, 4733, 264, 470, 4297.1, 672, 736, 2579, 2269. **1.121**: 1568, 2134, 4064, 4324, 275, 2580, 5164, 520, 2509, 1341, 2669, 2849.1. **1.131**: 3170, 805, 2578, 893, 4381, 3171, 46, 48, 383, 3945, 146, 3253, 3886, 4023. **1.150**: 1756, 1388, 2127, 1390, 𝔅439, 948, 1917, 994, 2284.1, 3606, 658, 859. **1.160**: 2084, 3289, 𝔅438, 1253, 453, 2004, 460, 2499, 1252, 1692, 189, 949, 2696. **1.180**: 3694, 887, 𝔅798, 379, 2618, 5282, 655, 659, 2498, 1042, 3455, 334. **1.200**: 1031, 2850, 1347, 1859, 227, 696, 1375, 858, 1041, 1376, 279, 632, 710. **1.220**: 37, 384, 744, 1040, 2316, 𝔅514, 1576, 4442, 4441, 𝔅435, 803, 1314, 1857, 863, 921.1, 1916. **1.252**: 190, 1856, 515, 742, 67, 359, 2098, 741, 604, 3937, 1230, 𝔅442, 1959, 1229. **1.310**: 𝔅1575, 465, 192, 1327, 1506, 472, 473, 𝔅441, 1251, 1250, 604.1, 1540, 421, 1588, 158, 28, 1249, 2053. **1.340**: 𝔅366, 464, 423, 2639, 230, 365, 2637, 422, 2633, 1326, 𝔅42, 585, 963, 276, 558, 582, 366. **1.400**: 497, 2491, 2423, 545, 2031, 605, 2030, 2492, 2493, 364, 𝔅634, 2029, 1697, 𝔅2, 159, 𝔅96, 𝔅635, 220, 𝔅1397. **1.460**: 𝔅11, 648, 5350, 1672, 225, 3453, 106, 𝔅10, 61, 𝔅636, 𝔅352, 19, 329, 648.3, 1053, 1294, 2119. **1.500**: 1578.1, 𝔅632, 𝔅637, 43, 1052, 1822, 107, 648.1, 137, 1051, 2454, 648.4, 𝔅629. **1.526**: 141, 𝔅633, 467, 136, 1844, 1367, 𝔅207, 645, 139, 𝔅630, 12, 756. **1.600**: 140, 367, 755, 754, 90, 1601, 𝔅521, 𝔅232, 𝔅58, 2494, 𝔅129, 𝔅512, 𝔅628, 𝔅59, 757, 𝔅210, 𝔅57, 𝔅100, 221, 2061, 2062. **1.700**: 368, 555, 476, 987, 694, 475, 𝔅62, 693, 𝔅13, 414, 𝔅622, 690. **1.800**: 2064, 689, 1949, 688, 1759, 1333, 𝔅523, 𝔅45, 390, 𝔅1597, 𝔅60, 38, 𝔅1808, 116, 𝔅621. **1.901**: 𝔅163, 600, 𝔅39, 412, 341, 234, 1205, 413, 𝔅619, 83, 339, 340, 183, 𝔅218, 𝔅522. **2.110**: 415, 122, 184, 649, 186, 𝔅188, 123, 𝔅236, 45, 522, 370, 𝔅378, 𝔅76, 𝔅919, 4, 427. **2.529**: 601, 20, 151, 𝔅1815, 𝔅63, 𝔅142, 345, 𝔅64, 101, 5, 127, 18, 235, 128. **3.022**: 𝔅204, 𝔅918, 𝔅497, 𝔅381, 29, 𝔅34, 𝔅206, 87, 𝔅205. **4.49.**

B. Solids

0.760: 846, 5881, 5918, 5967, 5985, 6014, 6080, 𝔅2916, 5244, 2266, 𝔅2601, 1502, 936, 4406, 6010. **0.919**: 𝔅2667, 548, 3016, 𝔅1812, 3257, 4805, 1058, 239, 3756, 481, 3302. **1.008**: 607, 5343.1, 3901, 𝔅2791, 761, 2573, 4322, 1057, 4652, 3307, 760, 2801, 5902, 482, 1077, 2206, 831. **1.061**: 2160, 5817, 5933, 1771, 3140, 289, 571, 𝔅2643, 3853, 3550, 502, 2116, 3494, 5214.1. **1.160**: 5213.1, 238, 4270, 2166, 3498, 4352, 832, 𝔅131, 𝔅430, 𝔅2623, 5887, 4943, 5404, 5284, 4894, 2595. **1.203**: 4225, 𝔅2626, 259, 5818, 3886 1, 𝔅2998, 504, 298, 3867.1, 5428.1, 𝔅5, 𝔅1896, 2701, 4480, 2308 1, 4226. **1.260**: 4167, 4956, 503, 5573, 1705, 𝔅2624, 5435, 2032, 5202, 𝔅2306, 1287, 1992, 308.1, 1581, 55, 5541, 5028.1, 1990, 1414. **1.35**: 6104, 4739, 5647, 𝔅111, 5028, 4656.1, 802, 3697, 𝔅173, 3111, 5704, 𝔅2655, 5522. **1.40**: 498, 2175, 58, 4622, 1929, 947, 𝔅134, 𝔅2170, 𝔅2347, 1398, 6148, 1397, 5659, 𝔅2300, 4620, 2013, 1349, 𝔅3086, 3778. **1.45**: 𝔅2757, 808, 3178, 1419, 𝔅2171, 630, 𝔅2807, 1231, 𝔅2636, 976, 𝔅2119, 𝔅2693, 1351. **1.47**: 𝔅2990, 204, 1464, 1991, 2682.1, 𝔅2814, 1172, 1350, 𝔅1400, 𝔅1800, 𝔅201, 𝔅2855. **5.0**: 𝔅502, 𝔅1328, 𝔅1350, 𝔅1126, 𝔅1428, 𝔅1844, 𝔅1994, 𝔅289, 𝔅1969, 𝔅1260, 𝔅1375, 𝔅2282, 𝔅1712, 𝔅2202, 𝔅1539, 𝔅499. **5.10**: 𝔅311, 𝔅1130, 𝔅2017, 𝔅734, 𝔅1334, 𝔅994, 𝔅2035.1, 𝔅3329, 𝔅1021, 𝔅2030, 𝔅2513, 𝔅456, 𝔅507, 𝔅554, 𝔅1258, 𝔅1441, 𝔅3061, 𝔅829. **5.2**: 𝔅280, 𝔅1096, 𝔅1337, 𝔅1682, 𝔅1711, 𝔅1063, 𝔅1371, 𝔅1590, 𝔅1686, 𝔅2518, 𝔅1990, 𝔅1992, 𝔅2516, 𝔅618, 𝔅462. **5.3**: 𝔅600, 𝔅677, 𝔅716, 𝔅724, 𝔅1154, 𝔅1634, 𝔅313, 𝔅595, 𝔅1423, 𝔅593, 𝔅1049, 𝔅1236, 𝔅1103, 𝔅1767, 𝔅883, 𝔅1457, 𝔅862, 𝔅608, 𝔅715, 𝔅864, 𝔅473, 𝔅1095. **5.50**: 𝔅592, 𝔅1630, 𝔅1671, 𝔅1852, 𝔅1542, 𝔅1065, 𝔅544, 𝔅723, 𝔅956, 𝔅1059, 𝔅708. **5.6**: 𝔅306, 𝔅306.1, 𝔅1304, 𝔅1710, 𝔅1726, 𝔅744, 𝔅601, 𝔅603, 𝔅951, 𝔅971, 𝔅1636, 𝔅1763, 𝔅1123, 𝔅27, 𝔅670, 𝔅1064, 𝔅1996, 𝔅1440, 𝔅1455. **5.7**: 𝔅320, 𝔅322, 𝔅1372, 𝔅1418, 𝔅1614, 𝔅2339, 𝔅714, 𝔅2494, 𝔅473.1, 𝔅1421, 𝔅546, 𝔅2338, 𝔅1632, 𝔅1098, 𝔅1723, 𝔅957, 𝔅582, 𝔅2599. **5.8**: 𝔅568, 𝔅596, 𝔅1117, 𝔅1685, 𝔅1978, 𝔅1391, 𝔅2048, 𝔅529, 𝔅574, 𝔅2571, 𝔅2049, 𝔅1163, 𝔅541. **5.9**: 𝔅602, 𝔅1118, 𝔅1652, 𝔅1703, 𝔅907, 𝔅1071, 𝔅565, 𝔅2507, 𝔅597, 𝔅2538, 𝔅1736, 𝔅1562. **6.0**: 𝔅401, 𝔅936, 𝔅1050, 𝔅1506, 𝔅1781, 𝔅1227, 𝔅540, 𝔅2059, 𝔅894, 𝔅2366, 𝔅1442, 𝔅1105. **6.1**: 𝔅594, 𝔅1022, 𝔅1101, 𝔅1402, 𝔅1666, 𝔅1784, 𝔅402, 𝔅658, 𝔅657, 𝔅548, 𝔅1655, 𝔅501, 𝔅606, 𝔅2483, 𝔅1327. **6.2**: 𝔅553, 𝔅614, 𝔅1124, 𝔅1390, 𝔅1617, 𝔅863, 𝔅539, 𝔅1800, 𝔅898, 𝔅1116, 𝔅897, 𝔅1055. **6.3**: 𝔅604, 𝔅607, 𝔅1100, 𝔅1119, 𝔅1517, 𝔅1570, 𝔅1631, 𝔅1366, 𝔅2580, 𝔅1722, 𝔅559, 𝔅1086. **6.4**: 𝔅335, 𝔅605, 𝔅667, 𝔅934, 𝔅935, 𝔅995, 𝔅1834, 𝔅1025, 𝔅905, 𝔅575, 𝔅616, 𝔅889, 𝔅834, 𝔅672, 𝔅1051, 𝔅1062, 𝔅503, 𝔅833, 𝔅663, 𝔅1121. **6.5**: 𝔅609, 𝔅660, 𝔅1102, 𝔅1501, 𝔅1958, 𝔅1629, 𝔅3118, 𝔅659, 𝔅509, 𝔅598. **6.6**: 𝔅611, 𝔅617, 𝔅1573, 𝔅2827, 𝔅1285, 𝔅824, 𝔅1698, 𝔅543, 𝔅996, 𝔅1143, 𝔅1619. **6.7**: 𝔅1405, 𝔅2007, 𝔅2006, 𝔅545, 𝔅666, 𝔅1374, 𝔅1620, 𝔅1024, 𝔅719, 𝔅1502. **6.8**: 𝔅573, 𝔅671, 𝔅327, 𝔅336, 𝔅551, 𝔅576, 𝔅581, 𝔅1776, 𝔅2005, 𝔅712, 𝔅1700, 𝔅1306. **6.9**: 𝔅610, 𝔅661, 𝔅1040, 𝔅1103, 𝔅1681, 𝔅1688, 𝔅1840, 𝔅2834, 𝔅557, 𝔅612, 𝔅1621, 𝔅484, 𝔅1235. **7.0**: 𝔅485, 𝔅578, 𝔅588, 𝔅613, 𝔅696, 𝔅1386, 𝔅1104, 𝔅1854, 𝔅599, 𝔅2041, 𝔅1807, 𝔅536, 𝔅584. **7.1**: 𝔅586, 𝔅589, 𝔅1565, 𝔅585, 𝔅725, 𝔅3188, 𝔅587, 𝔅334, 𝔅590, 𝔅882, 𝔅1171, 𝔅1842, 𝔅681, 𝔅1734, 𝔅2828. **7.2**: 𝔅1233, 𝔅1697, 𝔅535, 𝔅2023, 𝔅1847, 𝔅615, 𝔅2826, 𝔅2830, 𝔅577, 𝔅1247, 𝔅1977, 𝔅893, 𝔅1705, 𝔅1067, 𝔅1066, 𝔅910, 𝔅325. **7.4**: 𝔅1128, 𝔅1385, 𝔅1393, 𝔅1843, 𝔅1849, 𝔅2062, 𝔅2060, 𝔅2037, 𝔅1057, 𝔅1528. **7.5**: 𝔅305, 𝔅314, 𝔅330, 𝔅552, 𝔅900, 𝔅1833, 𝔅1041, 𝔅700, 𝔅904, 𝔅538, 𝔅1170, 𝔅1464, 𝔅324. **7.7**: 𝔅328, 𝔅896, 𝔅318, 𝔅902, 𝔅2079, 𝔅1384, 𝔅1848, 𝔅1146, 𝔅323, 𝔅891, 𝔅676. **8.0**: 𝔅525, 𝔅704, 𝔅1004, 𝔅1070, 𝔅1732, 𝔅1850, 𝔅580, 𝔅321, 𝔅558, 𝔅901, 𝔅821, 𝔅560, 𝔅822. **8.2**: 𝔅308, 𝔅1695, 𝔅528, 𝔅1326, 𝔅888, 𝔅890, 𝔅1662, 𝔅1701, 𝔅1550, 𝔅888, 𝔅1017, 𝔅309, 𝔅1072, 𝔅1684, 𝔅1780. **8.64**: 𝔅2082, 𝔅887, 𝔅880, 𝔅895, 𝔅1137, 𝔅1806, 𝔅1169, 𝔅307, 𝔅1663, 𝔅881, 𝔅675. **9.04**: 𝔅1139, 𝔅527, 𝔅892, 𝔅2087, 𝔅526, 𝔅524, 𝔅2099, 𝔅668, 𝔅879, 𝔅1152, 𝔅1702, 𝔅1179, 𝔅1855, 𝔅1693. **11.1**: 𝔅878, 𝔅1725, 𝔅1724, 𝔅1224, 𝔅1225, 𝔅1689, 𝔅1690. **16.06.**

LIQUID CRYSTALS

H. W. Foote

The term "transition temperature" refers in the tables to the temperature at which the solid and crystalline-liquid phases are in equilibrium at a pressure of one atmosphere; by "melting point," is meant the corresponding temperature at which the crystalline-liquid and isotropic liquid phases are in equilibrium. In some cases, more than one stable liquid crystal phase exists, giving an additional transition temperature for each additional liquid crystal phase. These transition temperatures between two liquid crystal phases are indicated by *. In most cases, they are only approximate. Melting points which are quite uncertain, usually due to partial decomposition, have "d" written after the value. No attempt has been made to estimate the accuracy of values obtained by a single investigator, as the methods of determination are the same in nearly every case and the result obviously depends on the skill of the investigator and the purity of the compounds.

A series of apparently good determinations by different observers is apt to vary by considerably more than one degree, and it seems unlikely that any transition temperature or melting point of liquid crystals is known with an accuracy much better than one degree. For this reason, the weighted average of a number of different determinations is usually given to the nearest whole degree. When the number of determinations is sufficient, the weighted average deviation, usually to the nearest whole degree, is given also.

The melting points of unstable liquid crystals, in monotropic systems, are not included in the tables, and transition temperatures, in the ordinary sense, do not exist in this case. Many observations on monotropic compounds will be found in nearly all the Halle dissertations and in the publications by Vorländer, which are listed at the end of the tables.

For the effect of pressure on the transition temperature and melting point of liquid crystals, see G. Hulett, *7*, **28**: 629; 99. For approximate data on liquid crystals of alkali salts of higher fatty acids (chiefly) see Vorländer, *25*, **43**: 3120; 10. For similar data regarding compounds which are optically active, see H. Stoltzenberg, Diss., Halle (1911). For qualitative data regarding liquid crystals, see E. Wolferts, Diss., Halle (09), R. Wilke, Diss., Halle (09); K. Mattenklodt, Diss., Halle (11); and Vorländer, *25*, **40**: 1415, 1966, 07.

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{10}H_{10}O_3$	$CH_3OC_6H_4CH:CHCOOH$	*p*-Methoxycinnamic acid	170 ± 1	186 ± 1	(7, 11, 30, 33, 34, 42, 43, 45)
$C_{11}H_{12}O_3$	$C_2H_5OC_6H_4CH:CHCOOH$	*p*-Ethoxycinnamic acid	192	197	(42)
$C_{12}H_{14}O_3$	$C_2H_5OC_6H_4CCH_3:CHCOOH$	*p*-Ethoxy-β-methylcinnamic acid	122.5	159	(37)
$C_{14}H_{10}BrNO_2$	$BrC_6H_4CH:NC_6H_4COOH$	*p*-Bromobenzal-*p*-aminobenzoic acid	272	274	(12)
$C_{14}H_{10}ClNO_2$	$ClC_6H_4CH:NC_6H_4COOH$	*p*-Chlorobenzal-*p*-aminobenzoic acid	260	263	(12)
$C_{14}H_{10}INO_2$	$IC_6H_4CH:NC_6H_4COOH$	*p*-Iodobenzal-*p*-aminobenzoic acid	279	287	(12)
$C_{14}H_{10}O_5$	$HOC_6H_4COOC_6H_4COOH$	*p*-(*p*-Hydroxybenzoxy)-benzoic acid	258	266 ±	(45)
$C_{14}H_{11}NO_2$	$C_6H_5CH:NC_6H_4COOH$	Benzal-*p*-aminobenzoic acid	183	191	(26)
$C_{14}H_{12}N_2O_3$	$O_2NC_6H_4CH:NC_6H_4OCH_3$	*p*-Nitrobenzalanisidine	135		(26)
$C_{14}H_{14}N_2O_3$	$CH_3OC_6H_4NONC_6H_4OCH_3$	*p*-Azoxyanisol	116 ± 1	135 ± 1	(1, 3, 6, 7, 9, 11, 14, 19, 23, 30, 32, 35, 36, 42, 45)
$C_{14}H_{15}N_3$	$CH_3NHC_6H_4CH:NNHC_6H_5$	*p*-Methylaminobenzalphenylhydrazone	170	190	(34)
$C_{15}H_{10}N_2O_2$	$CNC_6H_4CH:NC_6H_4COOH$	*p*-(*p*-Cyanobenzalamino)-benzoic acid	247	>320	(17)
$C_{15}H_{12}N_2O$	$CNC_6H_4CH:NC_6H_4OCH_3$	*p*-Cyanobenzalanisidine	115	125	(17)
$C_{15}H_{12}N_2O$	$CH_3OC_6H_4CH:NC_6H_4CN$	Anisal-*p*-cyanoaniline	103	113.5	(12)
$C_{15}H_{12}N_2O_4$	$CH_3COOC_6H_4N:NC_6H_4COOH$	*p*-Acetoxyazobenzoic acid	254	d.	(31)
$C_{15}H_{12}O_2$	$C_6H_5C_6H_4CH:CHCOOH$	*p*-Phenylcinnamic acid	221	236	(2)
$C_{15}H_{12}O_5$	$CH_3OC_6H_4COOC_6H_4COOH$	*p*-(*p*-Methoxybenzoxy)-benzoic acid	223	272	(45)
$C_{15}H_{13}NO_2$	$CH_3C_6H_4CH:NC_6H_4COOH$	*p*-(*p*-Methylbenzalamino)-benzoic acid	220	243	(26)
$C_{15}H_{13}NO_3$	$CH_3OC_6H_4CH:NC_6H_4COOH$	*p*-(Anisalamino)-benzoic acid	197	208 d.	(15, 46)
$C_{15}H_{14}N_2O_3$	$O_2NC_6H_4CH:NC_6H_4OC_2H_5$	*p*-Nitrobenzalphenetidine	124		(26)
$C_{15}H_{16}N_2O_3$	$CH_3OC_6H_4NONC_6H_4OC_2H_5$	*p*-Anisylazoxyphenetol	94 ± 1	149 ± 1	(4, 7, 32)
$C_{15}H_{17}N_3$	$C_2H_5NHC_6H_4CH:NNHC_6H_5$	*p*-Ethylaminobenzalphenylhydrazone	160	182	(34)
$C_{16}H_{12}O_6$	$CH_3COOC_6H_4COOC_6H_4COOH$	*p*-Hydroxybenzoic acid *p*-acetoxybenzoate	228 d.	>250	(45)
$C_{16}H_{12}O_7$	$CH_3OCOOC_6H_4COOC_6H_4COOH$	*p*-Hydroxybenzoic acid *p*-carbomethoxyoxybenzoate	218 d.	d.	(45)
$C_{16}H_{14}N_2O$	$CNC_6H_4CH:NC_6H_4OC_2H_5$	*p*-Cyanobenzalphenetidine	115	132	(17)
$C_{16}H_{14}N_2O$	$C_2H_5OC_6H_4CH:NC_6H_4CN$	*p*-Ethoxybenzal-*p*-cyanoaniline	105	124	(12)
$C_{16}H_{14}N_2O_2$	$O_2NC_6H_4CH:CHCH:NC_6H_4CH_3$	*p*-Nitrocinnamal-*p*-toluidine	130	141	(26)
$C_{16}H_{14}N_2O_3$	$O_2NC_6H_4CH:CHCH:NC_6H_4OCH_3$	*p*-Nitrocinnamalanisidine	155	160	(26)
$C_{16}H_{15}NO_2$	$CH_3OC_6H_4CH:NC_6H_4COCH_3$	Anisal-*p*-aminoacetophenone	121.5	135	(15)
$C_{16}H_{15}NO_3$	$CH_3COOC_6H_4CH:NC_6H_4OCH_3$	*p*-Acetoxybenzalanisidine	112	128	(15)
$C_{16}H_{15}NO_3$	$CH_3OC_6H_4CH:NC_6H_4OCOCH_3$	*p*-(Anisalamino)-phenol acetate	81.5	108	(15)
$C_{16}H_{16}N_2O_2$	$CH_3COC_6H_4N:NC_6H_4OC_2H_5$	*p*-Acetophenoneazophenetol	130		(47)
$C_{16}H_{16}N_2O_2$	$CH_3OC_6H_4CH:NN:CHC_6H_4OCH_3$	Anisaldazine	165 ± 3	180 ± 1	(5, 6, 7, 19)
$C_{16}H_{16}N_2O_3$	$C_2H_5OC_6H_4N:NC_6H_4OCOCH_3$	*p*-Phenetolazophenol acetate	121	138	(46, 47)
$C_{16}H_{16}N_2O_4$	$CH_3OC_6H_4N:NC_6H_4OCOOC_2H_5$	*p*-Anisylazocarbethoxyphenol	90	114	(46, 47)
$C_{16}H_{18}N_2O_3$	$C_2H_5OC_6H_4NONC_6H_4OC_2H_5$	*p*-Azoxyphenetol	137 ± 1	167 ± 1	(3, 14, 19, 23, 30, 32, 35, 42, 45)
$C_{16}H_{20}N_2$	$C_2H_5NHC_6H_4C_6H_4NHC_2H_5$	Diethylbenzidine	115.5	120.5	(34)
$C_{17}H_{15}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOH$	*p*-(Anisalamino)-cinnamic acid	208	d.	(15)
$C_{17}H_{16}N_2O_3$	$O_2NC_6H_4CH:CHCH:NC_6H_4OC_2H_5$	*p*-Nitrocinnamalphenetidine	134	137	(26)
$C_{17}H_{16}N_2O_4$	$CH_3COC_6H_4N:NC_6H_4OCOOC_2H_5$	*p*-Acetophenoneazocarbethoxyphenol	120	126	(47)
$C_{17}H_{16}N_2O_4$	$CH_3COOC_6H_4N:NC_6H_4COOC_2H_5$	Ethyl *p*-acetoxyazobenzoate	99	102	(31)
$C_{17}H_{17}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH_2CH_2COOH$	*p*-(Anisalamino)-hydrocinnamic acid	136	162	(45)
$C_{17}H_{18}N_2O_4$	$C_2H_5OC_6H_4N:NC_6H_4OCOOC_2H_5$	*p*-Phenetolazocarbethoxyphenol	96	137	(47)
$C_{18}H_{15}ClO_4$	$CH_3COOC_6H_4CH:CClC_6H_4OCOCH_3$	*p*-Dihydroxychlorostilbene diacetate	125	138	(11, 29)
$C_{18}H_{16}N_2O_4$	$CH_3COOC_6H_4CH:NN:CHC_6H_4OCO\text{-}CH_3$	Di-(*p*-acetoxybenzalazine)	185	192	(16, 40)
$C_{18}H_{17}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH:CHCOOCH_3$	Methyl anisal-*p*-aminocinnamate	156	176	(43, 47)
$C_{17}H_{17}N_2O_3$	$CH_3OC_6H_4N:NC_6H_4CH:CHCOOC_2H_5$	Ethyl *p*-anisylazocinnamate	116, 123*	143	(46, 47)
$C_{18}H_{18}N_2O_5$	$C_2H_5OCOC_6H_4NONC_6H_4COOC_2H_5$	*p*-Azoxyethyl benzoate	114 ± 0.6	121 ± 0.5	(7, 11, 19, 27, 40, 42, 45)
$C_{18}H_{18}N_2O_6$	$C_2H_5OCOOC_6H_4N:NC_6H_4OCOOC_2H_5$	*p*-Azocarbethoxyphenol	97	118	(15)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{18}H_{18}N_2O_7$	$C_2H_5OCOOC_6H_4NONC_6H_4OCOOC_2H_5$	*p*-Azoxycarbethoxyphenol . .	95	130	(15)
$C_{18}H_{18}O_2$	$CH_3OC_6H_4CH:CHCH.CHC_6H_4OCH_3$	Di-(*p*-anisylbutadiene) . .	225	238	(34)
$C_{18}H_{20}N_2O_2$	$C_2H_5OC_6H_4CH.NN.CHC_6H_4OC_2H_5$	Di-(*p*-ethoxybenzalazine) .	172	195	(13, 24, 45)
$C_{18}H_{20}N_2O_2$	$CH_3OC_6H_4C(CH_3):NN:C(CH_3)C_6H_4$-$OCH_3$	Di-(*p*-methoxyacetophenoneazine). .	195	202	(16)
$C_{18}H_{20}N_2O_4$	$HOC_2H_4OC_6H_4CH:NN:CHC_6H_4$-$OC_2H_4OH$	Di-(hydroxyethoxybenzalazine) . . .	184	207	(13)
$C_{18}H_{22}N_2O_3$	$C_3H_7OC_6H_4NONC_6H_4OC_3H_7$	Di-(*p*-*n*-propoxyazoxybenzene)	116	122	(4, 40)
$C_{19}H_{16}N_2O_2$	$CNC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl *p*-cyanobenzal-*p*-aminocinnamate	131	179	(17)
$C_{19}H_{18}N_2O_4$	$CH_3COOC_6H_4N:NC_6H_4CH:CHCOO$-$C_2H_5$	Ethyl *p*-acetoxyphenylazocinnamate.	132	152	(47)
$C_{19}H_{19}NO_2$	$CH_3C_6H_4CH:NC_6H_4CH.CHCOOC_2H_5$	Ethyl *p*-(*p*-methylbenzalamino)-cinnamate . . .	96, 107*	118	(46, 47)
$C_{19}H_{19}NO_3$	$C_2H_5OC_6H_4CH.NC_6H_4CH:CCH_3$-$COOH$	*p*-(*p*-Ethoxybenzalamino)-α-methylcinnamic acid	180	265	(20)
$C_{19}H_{19}NO_3$	$CH_3OC_6H_4CH.NC_6H_4CH:CH$-$COOC_2H_5$	Ethyl (*p*-anisalamino)-cinnamate.	100, 108*, 117*	138	(9, 43, 46, 47)
$C_{19}H_{19}NO_3$	$C_2H_5OC_6H_4CH.NC_6H_4CH:CH$-$COOCH_3$	Methyl *p*-(*p*-ethoxybenzalamino)-cinnamate	132	187	(43, 47)
$C_{19}H_{22}N_2O_3$	$C_2H_5OC_6H_4N:NC_6H_4OCOC_4H_9$	*p*-Phenetolazophenol *n*-valerate	78 83	125	(47)
$C_{20}H_{13}N_3O_2$	$CNC_6H_4N:NC_6H_4OCOC_6H_5$	*p*-Cyanobenzeneazophenol benzoate	181	226	(12)
$C_{20}H_{14}Br_2N_2$	$BrC_6H_4N.CHC_6H_4CH:NC_6H_4Br$	*p*-Phthalal-di-(*p*-bromoaniline)	208	288	(17)
$C_{20}H_{14}Cl_2N_2$	$ClC_6H_4N.CHC_6H_4CH:NC_6H_4Cl$	*p*-Phthalal-di-(*p*-chloroaniline)	176	282	(17)
$C_{20}H_{14}I_2N_2$	$IC_6H_4N.CHC_6H_4CH.NC_6H_4I$	*p*-Phthalal-di-(*p*-iodoaniline)..	262	268	(12)
$C_{20}H_{14}N_4O_4$	$O_2NC_6H_4CH:NC_6H_4N.CHC_6H_4NO_2$	(Di-*p*-nitrobenzal)-*p*-phenylenediamine	212	315	(46)
$C_{20}H_{16}N_2O_3$	$CH_3OC_6H_4N\ NC_6H_4OCOC_6H_5$	*p*-Anisylazophenol benzoate	159 163	178	(47)
$C_{20}H_{17}NO$	$CH_3OC_6H_4CH:NC_6H_4C_6H_5$	Anisal-*p*-aminodiphenyl	161	177	(12, 46)
$C_{20}H_{17}N_3O$	$CH_3OC_6H_4CH:NC_6H_4N:NC_6H_5$	Anisal-*p*-aminoazobenzene	151	182	(15, 39, 46)
$C_{20}H_{18}N_2O_5$	$CH_3OCOCH:CHC_6H_4NONC_6H_4CH$ -$CHCOOCH_3$	Methyl azoxycinnamate	221	257	(40)
$C_{20}H_{20}N_2O_2$	$CH_3OC_6H_4CH:CHCH:NN:CHCH:$-$CHC_6H_4OCH_3$	Di-*p*-methoxycinnamicaldazine	210	218	(34)
$C_{20}H_{20}N_2O_4$	$C_2H_5COOC_6H_4CH:NN:CHC_6H_4OCO$-$C_2H_5$	Di-*p*-propionylhydroxybenzalazine	160	187	(16)
$C_{20}H_{20}N_2O_5$	$C_2H_5OCOOC_6H_4N:NC_6H_4CH\ CHCO$-$OC_2H_5$	Ethyl *p*-carbethoxyphenolazocinnamate	114	152	(47)
$C_{20}H_{21}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CHCOO$-$C_2H_5$	Ethyl *p*-(*p*-ethoxybenzalamino)-cinnamate. . . .	69, 113,* 152*	159	(43, 45, 46, 47)
$C_{20}H_{21}NO_3$	$CH_3OC_6H_4CH{\cdot}H_4CH:NC_6CCH_3COO$-$C_2H_5$	Ethyl *p*-(anisalamino)-α-methylcinnamate . .	90	93	(20, 43)
$C_{20}H_{21}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_3CO$-$OCH_3$	Methyl *p*-(*p*-ethoxybenzalamino)-α-methylcinnamate .	105	147	(20, 43)
$C_{20}H_{24}N_2O_2$	$C_2H_5OC_6H_4CCH_3:NN:CCH_3C_6H_4O$-$C_2H_5$	Di-*p*-ethoxyacetophenoneazine	142	163	(16)
$C_{21}H_{14}O_7$	$HOC_6H_4COOC_6H_4COOC_6H_4COOH$	*p*-Hydroxybenzoic acid *p*-(*p*-hydroxybenzoxy) benzoate	283	d.	(45)
$C_{21}H_{16}N_2O_3$	$CH_3COC_6H_4N:NC_6H_4OCOC_6H_5$	*p*-Acetophenoneazophenol benzoate.	211 d.		(47)
$C_{21}H_{17}NO$	$C_6H_5C_6H_4CH:NC_6H_4COCH_3$	*p*-(*p*-Phenylbenzalamino)-acetophenone	187 5		(2)
$C_{21}H_{18}N_2O_3$	$C_2H_5OC_6H_4N:NC_6H_4H_4OCOC_6H_5$	*p*-Phenetolazophenol benzoate . .	173	193	(46, 47)
$C_{21}H_{19}NO$	$C_2H_5OC_6H_4CH:NC_6H_4C_6H_5$	*p*-(*p*-Ethoxybenzalamino) diphenyl	145	184	(12)
$C_{21}H_{19}NO$	$C_6H_5C_6H_4CH:NC_6H_4OC_2H_5$	*p*-Phenylbenzal-*p*-phenetidine	164	189 5	(2)
$C_{21}H_{19}N_3O$	$C_2H_5OC_6H_4CH:NC_6H_4N\ NC_6H_5$	*p*-(*p*-Ethoxybenzalamino)-azobenzene	131 5	199	(2)
$C_{21}H_{21}NO_5$	$C_2H_5OCOOC_6H_4CH:NC_6H_4CH:CH$-$COOC_2H_5$	Ethyl *p*-[(*p*-carbethoxyoxybenzal)-amino] cinnamate	80	151	(47)
$C_{21}H_{23}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH\ CH$-$COOC_4H_9$	*n*-Butyl anisal-*p*-aminocinnamate.	58	76	(43)
$C_{21}H_{23}NO_3$	$C_2H_5OC_6H_4CH.NC_6H_4CH:CCH_3CO$-$OC_2H_5$	Ethyl *p*-(*p*-ethoxybenzalamino)-α-methylcinnamate.	95	122 ± 2	(9, 19, 20, 39, 43, 46)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{21}H_{23}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH:CCH_3$-$COOC_3H_7$	*n*-Propyl *p*-(anisalamino)-α-methylcinnamate	50	85	**(20, 43)**
$C_{22}H_{14}H_4$	$CNC_6H_4N:CHC_6H_4CH:NC_6H_4CN$	*p*-Phthalal-di-(*p*-cyanoaniline)	164	209	**(12)**
$C_{22}H_{17}NO_4$	$C_6H_5CH:NC_6H_4COOC_6H_4COOCH_3$	Methyl benzal-*p*-aminobenzoyl-*p*-hydroxybenzoate	174	177	**(45)**
$C_{22}H_{19}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4COOC_2H_5$	Ethyl *p*-(*p*-phenylbenzalamino)-benzoate	121.5	128.5	**(2)**
$C_{22}H_{20}N_2$	$CH_3C_6H_4CH:NC_6H_4N:CHC_6H_4CH_3$	Di-(*p*-tolual)-*p*-phenylenediamine	194	266	**(46)**
$C_{22}H_{20}N_2$	$CH_3C_6H_4N:CHC_6H_4CH:NC_6H_4CH_3$	*p*-Phthalal-di-(*p*-toluidine)	186	238	**(17)**
$C_{22}H_{20}N_{22}$	$CH_3OC_6H_4CH:NC_6H_4N.CHC_6H_4OCH_3$	Dianisal-*p*-phenylenediamine	210	338	**(46)**
$C_{22}H_{22}N_2O_2$	$CNC_6H_4C:HNC_6H_4CH:CHCOOC_5H_{11}$	*act*-Amyl *p*-(*p*-cyanobenzalamino)-cinnamate	95	107	**(17, 28, 46)**
$C_{22}H_{22}N_2O_4$	$C_2H_5OCOCH:CHC_6H_4N:NC_6H_4CH:$-$CHCOOC_2H_5$	Ethyl *p*-azocinnamate	155	230	**(15, 43)**
$C_{22}H_{22}N_2O_5$	$C_2H_5OCOCH:CHC_6H_4NONC_6H_4$-$CH:CHCOOC_2H_5$	Ethyl *p*-azoxycinnamate	140 ± 1	249 ± 1	**(7, 15, 28, 40, 43, 45)**
$C_{22}H_{22}O_3$	$CH_3OC_6H_4CH:C_6H_6O:CHC_6H_4OCH_3$	Dianisalcyclohexanone	159	170	**(2, 28, 44)**
$C_{22}H_{24}N_2O_4$	$C_3H_7COOC_6H_4CH:NN:CHC_6H_4O$-$COC_3H_7$	Di-*p*-butyryloxybenzalazine	146	181	**(16)**
$C_{22}H_{25}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH:CH$-$COOC_5H_{11}$	*act*-Amyl anisal-*p*-aminocinnamate	49	90	**(43)**
$C_{22}H_{25}NO_3$	$CH_3OC_6H_4CH:NC_6H_4CH:CH$-$COOC_5H_{11}$	*iso*-Amyl anisal-*p*-aminocinnamate	52	90	**(43)**
$C_{22}H_{25}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CHCOO$-$C_4H_9$	*n*-Butyl *p*-(*p*-ethoxybenzalamino)-cinnamate	68, 88*	125	**(43)**
$C_{22}H_{25}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CHCOH_3COO$-$C_3H_7$	*n*-Propyl *p*-(*p*-ethoxybenzalamino)-α-methylcinnamate	88	121	**(20, 43)**
$C_{23}H_{16}O_8$	$CH_3COOC_6H_4COOC_6H_4COO$-$C_6H_4COOH$	*p*-Hydroxybenzoic acid *p*-(*p*-acetoxybenzoxy)-benzoate	248	d.	**(45)**
$C_{23}H_{19}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CHCOOCH_3$	Methyl *p*-(*p*-phenylbenzalamino)-cinnamate	208, 216*	247	**(2)**
$C_{23}H_{19}NO_5$	$CH_3OC_6H_4CH:NC_6H_4COOC_6H_4COO$-$CH_3$	Methyl *p*-(anisalamino)-benzoyl-*p*-hydroxybenzoate	217	300	**(45)**
$C_{23}H_{21}NO_4$	$CH_3OC_6H_4CH:NC_6H_4CH_2OC_6H_4CO$-$OCH_3$	Methyl *p*-(anisalamino)benzyl-*p*-hydroxybenzoate	157	165	**(45)**
$C_{23}H_{24}O_3$	$C_2H_5OC_6H_4CH:C_5H_4O:CHC_6H_4OC_2H_5$	Di-(*p*-ethoxybenzal)-cyclopentanone	189, 194*	200	**(44)**
$C_{23}H_{27}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CHCOO$-$C_5H_{11}$	*act*-Amyl *p*-(*p*-ethoxybenzalamino)-cinnamate	68, 114*	121	**(43)**
$C_{23}H_{27}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CHCOO$-$C_5H_{11}$	*iso*-Amyl *p*-(*p*-ethoxybenzalamino)-cinnamate	81	137	**(43)**
$C_{23}H_{27}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_3CO$-$OC_4H_9$	*n*-Butyl *p*-(*p*-ethoxybenzalamino)-α-methylcinnamate	55, 65*	82	**(20, 43)**
$C_{23}H_{27}NO_3$	$CH_3OC_6H_4CH:NC_6H_6CH:CCH_3COO$-$C_5H_{11}$	*act*-Amyl *p*-(anisalamino)-α-methylcinnamate	62	69	**(46)**
$C_{24}H_{18}O_8$	$C_2H_5OCOOC_6H_4COOC_6H_4COOC_6H_4$-$COOH$	*p*-Hydroxybenzoic acid *p*-(*p*-carbethoxyoxybenzoxy) benzoate	215	d.	**(45)**
$C_{24}H_{20}N_2O_4$	$C_6H_5COOC_6H_4N:NC_6H_4CH:CHCOO$-$C_2H_5$	Ethyl *p*-benzoyloxyphenylazocinnamate	135	212	**(47)**
$C_{24}H_{21}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CH$-$COOC_2H_5$	Ethyl *p*-(*p*-phenylbenzalamino)-cinnamate.	145, 180,* 205,* 210*	219	**(2, 39, 43, 46)**
$C_{24}H_{22}N_2O_4$	$CH_3OC_6H_4CH:NC_6H_4CONHC_6H_4$-$COOC_2H_5$	Ethyl *p*-(anisalamino)-benzoyl-*p*-aminobenzoate	212, 220*	247	**(45, 46)**
$C_{24}H_{24}Br_2N_2O_5$	$C_2H_5OCOCCH_3:CBrC_6H_4NONC_6H_4$-$CBr:CCH_3COOC_2H_5$	Ethyl *p*-azoxy-α-methyl-β-bromcinnamate	110, 132*	138	**(20)**
$C_{24}H_{24}N_2O_2$	$C_2H_5OC_6H_4CH:NC_6H_4N:CHC_6H_4O$-$C_2H_5$	Di-(*p*-ethoxybenzal)-*p*-phenylenediamine	200		**(2)**
$C_{24}H_{24}N_2O_2$	$C_2H_5OC_6H_4N:CHC_6H_4CH:NC_6H_4O$-$C_2H_5$	*p*-Phthalal-di-(*p*-phenetidine)	197	324	**(17)**
$C_{24}H_{24}N_2O_5$	$C_3H_5OCOCH:CHC_6H_4NONC_6H_4$-$CH:CHCOOC_3H_5$	Allyl *p*-azoxycinnamate.	124	235	**(40)**
$C_{24}H_{26}N_2O_5$	$C_2H_5OCOCCH_3:CHC_6H_4NONC_6H_4$-$CH:CCH_3COOC_2H_5$	Ethyl *p*-azoxy-α-methylcinnamate.	109, 134*	140	**(20, 21)**

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{24}H_{26}N_2O_5$	$C_3H_7OCOCH.CHC_6H_4NONC_6H_4CH:CHCOOC_3H_7$	*iso*-Propyl *p*-azoxycinnamate	150	184	(40)
$C_{24}H_{26}N_2O_5$	$C_3H_7OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOC_3H_7$	*n*-Propyl *p*-azoxycinnamate	123	243	(40)
$C_{24}H_{26}O_3$	$C_2H_5OC_6H_4CH:C_6H_6O:CHC_6H_4OC_2H_5$	Di-(*p*-ethoxybenzal)-cyclohexanone	146	176	(44)
$C_{24}H_{28}N_2O_4$	$C_4H_9COOC_6H_4CH:NN:CHC_6H_4OCOC_4H_9$	Di-(*p*-valerylhydroxy)-benzalazine	145	160	(16)
$C_{24}H_{28}N_2O_4$	$C_4H_9COOC_6H_4CH:NN:CHC_6H_4OCOC_4H_9$	Di-(*p*-isovalerylhydroxy)-benzalazine	131	156	(16)
$C_{24}H_{29}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_3COOC_5H_{11}$	*act*-Amyl *p*-(*p*-ethoxybenzalamino)-α-methylcinnamate	86	100	(20, 43)
$C_{24}H_{29}NO_3$	$C_2H_5OC_6H_4CH:NC_6H_4CH:CCH_3COOC_5H_{11}$	*iso*-Amyl *p*-(*p*-ethoxybenzalamino)-α-methylcinnamate	83	90	(20, 43)
$C_{25}H_{18}N_2O_2$	$C_6H_5C_6H_4N:NC_6H_4OCOC_6H_5$	*p*-Diphenylazophenol benzoate	194	240	(12)
$C_{25}H_{19}N_3$	$C_6H_5C_6H_4CH:NC_6H_4N:NC_6H_5$	*p*-(*p*-Phenylbenzalamino)-azobenzene	207	252	(2)
$C_{25}H_{20}O_8$	$CH_3COOC_6H_4COOC_6H_4COOC_6H_4COOC_2H_5$	Ethyl *p*-hydroxybenzoate *p*-(*p*-acetoxybenzoxy) benzoate	112	282	(45)
$C_{25}H_{21}NO_4$	$C_6H_5COOC_6H_4CH:NC_6H_4CH:CHCOOC_2H_5$	Ethyl *p*-(*p*-benzoxybenzalamino)-cinnamate	125	217	(47)
$C_{25}H_{23}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CCH_3COOC_2H_5$	Ethyl *p*-(*p*-phenylbenzalamino)-α-methylcinnamate	120, 148*	175	(20, 43)
$C_{25}H_{28}N_2O_5$	$C_3H_7OCOCCH_3:CHC_6H_4NONC_6H_4CH.CHCOOC_3H_7$	*n*-Propyl *p*-azoxy-α-methylcinnamate	70, 125*?	128	(20)
$C_{26}H_{18}Br_2N_2$	$BrC_6H_4CH:NC_6H_4C_6H_4N:CHC_6H_4Br$	Di-(*p*-bromobenzal)-benzidine	285	312	(12)
$C_{26}H_{18}Cl_2N_2$	$ClC_6H_4CH:NC_6H_4C_6H_4N:CHC_6H_4Cl$	Di-(*p*-chlorobenzal)-benzidine	265	318	(12)
$C_{26}H_{18}Cl_2N_4O$	$ClC_6H_4N:CHC_6H_4NONC_6H_4CH:NC_6H_4Cl$	*p*-Azoxybenzaldi-*m*-chloraniline	174, 181,* 198*	213	(46)
$C_{26}H_{18}I_2N_2$	$IC_6H_4CH:NC_6H_4C_6H_4N:CHC_6H_4I$	Di-(*p*-iodobenzal)-benzidine	>300		(12)
$C_{26}H_{18}N_2O_4$	$C_6H_5COOC_6H_4N:NC_6H_4OCOC_6H_5$	*p*-Dibenzoylazophenol	208	250	(15, 39)
$C_{26}H_{18}N_2O_5$	$C_6H_5COOC_6H_4NONC_6H_4OCOC_6H_5$	*p*-Dibenzoylazoxyphenol	192	280	(15)
$C_{26}H_{18}N_4O_6$	$O_2NC_6H_4CONHC_6H_4C_6H_4NHCOC_6H_4NO_2$	Di-(*p*-nitrobenzoyl)-benzidine	365	d.	(45)
$C_{26}H_{18}O_4$	$C_6H_5OCOC_6H_4C_6H_4COOC_6H_5$	Diphenyl *p*, *p*′-diphenylcarboxylate	213	245	(45)
$C_{26}H_{20}N_2$	$C_6H_5CH:NC_6H_4C_6H_4N:CHC_6H_5$	Dibenzalbenzidene	234	260	(6, 24)
$C_{26}H_{20}N_2$	$C_6H_5C_6H_4CH:NN:CHC_6H_4C_6H_5$	Di-*p*-phenylbenzalazine	245	271	(2)
$C_{26}H_{22}N_2$	$CH_3C_6H_4CH:NC_{10}H_6N:CHC_6H_4CH_3$	Di-*p*-tolual-1, 5-naphthylenediamine	210	230	(46)
$C_{26}H_{22}N_2O_2$	$CH_3OC_6H_4CH:NC_{10}H_6N:CHC_6H_4OCH_3$	Dianisal-1, 5-naphthylenediamine	206	313	(46)
$C_{26}H_{22}N_4O_2$	$H_2NC_6H_4CONHC_6H_4C_6H_4NHCOC_6H_4NH_2$	Di-(*p*-aminobenzoyl)-benzidine	312	d.	(45)
$C_{26}H_{24}N_2O_4$	$C_6H_4(CH:NC_6H_4COOC_2H_5)_2$	Ethyl *p*-phthalal-di-(*p*-aminobenzoate)	189	230	(17)
$C_{26}H_{25}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CHCOOC_4H_9$	*n*-Butyl *p*-phenylbenzal-*p*-aminocinnamate	167	203	(43)
$C_{26}H_{26}N_2O_5$	$C_3H_5OCOCCH_3.CHC_6H_4NONC_6H_4CH:CCH_3COOC_3H_5$	Allyl *p*-azoxy-α-methylcinnamate	75	115	(20)
$C_{26}H_{26}N_2O_9$	$C_2H_5OCOCH_2OCOCH:CHC_6H_4NONC_6H_4CH:CHCOOCH_2COOC_2H_5$	*p*-Azoxycinnamic acid ethyl glycolate ester	148	235	(40)
$C_{26}H_{30}N_2O_5$	$C_4H_9OCOCH.CHC_6H_4NONC_6H_4CH:CHCOOC_4H_9$	*n*-Butyl *p*-azoxycinnamate	111	214	(40)
$C_{27}H_{27}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CHCOOC_5H_{11}$	*act*-Amyl *p*-(*p*-phenylbenzalamino)-cinnamate	115, 153*	180	(43)
$C_{27}H_{27}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CHCOOC_5H_{11}$	*iso*-Amyl *p*-(*p*-phenylbenzalamino)-cinnamate	164, 188*	197	(43)
$C_{27}H_{27}NO_2$	$C_6H_5C_6H_4CH:NC_6H_4CH:CCH_3COC_4H_9$	*n*-Butyl *p*-(*p*-phenylbenzalamino)-α-methylcinnamate	99, 137*	149	(20, 43, 46)
$C_{27}H_{27}NO_2$	$C_6H_5C_6O_4CH:NC_6H_4CH.CC_2H_5COOC_3H_7$	*n*-Propyl *p*-(*p*-phenylbenzalamino)-α-ethylcinnamate	119	135	(20, 21, 43)
$C_{28}H_{18}O_4$	$C_6H_5COOC_6H_4C:CC_6H_4OCOC_6H_5$	Di-*p*-oxytolanedibenzoate	214	254	(41)
$C_{28}H_{20}N_2O_4$	$C_6H_5COOC_6H_4CH:NN:CHC_6H_4OCOC_6H_5$	Di-*p*-benzoxybenzalazine	227	290	(16, 40)

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{28}H_{20}O_4$	$C_6H_5COOC_6H_4CH:CHC_6H_4OCOC_6H_5$	Di-*p*-hydroxystilbene dibenzoate	224	285 d.	**(41)**
$C_{28}H_{24}N_2$	$(C_6H_4N:CHC_6H_4CH_3)_2$	Di-(*p*-tolual)-benzidene	231	>300	**(6, 24)**
$C_{28}H_{24}N_2O_2$	$(C_6H_4N:CHC_6H_4OCH_3)_2$	Dianisalbenzidene	258		**(46)**
$C_{28}H_{28}N_2O_4$	$C_6H_5COOC_6H_4N:NC_6H_4CH:CCH_3$-$COOC_5H_{11}$	*act*-Amyl *p*-benzoylazophenol-α-methylcinnamate	88	120	**(20)**
$C_{28}H_{34}N_2O_5$	$C_5H_{11}OCOCH:CHC_6H_4NONC_6H_4$-$CH:CHCOOC_5H_{11}$	*iso*-Amyl *p*-azoxycinnamate	144	186	**(40)**
$C_{28}H_{34}N_2O_5$	$C_4H_9OCOCCH_3:CHC_6H_4NONC_6H_4$-$CH:CCH_3COOC_4H_9$	*iso*-Butyl *p*-azoxy-α-methylcinnamate	86, 110*	125.5	**(20)**
$C_{28}H_{34}N_2O_5$	$C_4H_9OCOCCH_3:CHC_6H_4NONC_6H_4$-$CH:CCH_3COOC_4H_9$	*n*-Butyl *p*-azoxy-α-methylcinnamate	60	100	**(20)**
$C_{30}H_{22}N_2O_3$	$C_6H_5COCH:CHC_6H_4NONC_6H_4CH:$-$CHCOC_6H_5$	*p*-Azoxybenzalacetophenone	213		**(47)**
$C_{30}H_{28}N_2O_2$	$(C_6H_4N:CHC_6H_4OC_2H_5)_2$	Di-(*p*-ethoxybenzal)-benzidine	248	>300	**(13)**
$C_{30}H_{28}N_2O_2$	$(C_6H_4N:CHC_6H_3CH_3OCH_3)_2$	Di-(*p*-methoxy-*o*-methylbenzal)-benzidine	171	>300	**(13)**
$C_{30}H_{28}N_2O_4$	$C_6H_4(CH:NC_6H_4CH:CHCOOC_2H_5)_2$	Ethyl *p*-phthalal-di-(*p*-aminocinnamate)	171, 270*	310	**(17)**
$C_{30}H_{50}O_2$	$C_2H_5COOC_{27}H_{45}$	Cholesterol propionate	97 ± 2	112 ± 2	**(6, 10, 18, 30)**
$C_{30}H_{50}O_3$	$C_2H_5OCOOC_{27}H_{45}$	Cholesterol ethyl carbonate	83	103.5	**(8)**
$C_{31}H_{52}O_2$	$C_3H_7COOC_{27}H_{45}$	Cholesterol *n*-butyrate	96.4	107.3	**(18)**
$C_{31}H_{52}O_3$	$C_3H_7OCOOC_{27}H_{45}$	Cholesterol *n*-propyl carbonate	99	101	**(8)**
$C_{32}H_{24}N_2$	$C_6H_4(N:CHC_6H_4C_6H_5)_2$	Di-(*p*-phenylbenzal)-*p*-phenylenediamine	284	>300	**(2)**
$C_{32}H_{24}N_2O_4$	$C_6H_5CH:CHCOOC_6H_4CH:NN:CH$-$C_6H_4OCOCH:CHC_6H_5$	Di-(*p*-cinnamylhydroxy)-benzalazine	206	245	**(16)**
$C_{32}H_{24}O_{10}$	$CH_3COOC_6H_4COOC_6H_4COOC_6H_4$-$COOC_6H_4COOC_2H_5$	Ethyl *p*-hydroxybenzoate *p*-[*p*-(*p*-acetoxybenzoxy)benzoxy]benzoate.	187 d	d.	**(45)**
$C_{32}H_{26}O$	$C_6H_5C_6H_4CH:C_6H_6O:CHC_6H_4C_6H_5$	Di-(*p*-phenylbenzal)-cyclohexanone	236.5	237.5	**(2)**
$C_{32}H_{32}N_2O_2$	$C_2H_5OCH_3C_6H_3CH:NC_6H_4C_6H_4N:C$-$HC_6H_3CH_3OC_2H_5$	Di(-*p*-ethoxy-*o*-methylbenzal)-benzidine	167	>300	**(13)**
$C_{32}H_{54}O_2$	$C_4H_9COOC_{27}H_{45}$	Cholesterol valerate	91.8	99.2	**(18)**
$C_{32}H_{54}O_3$	$C_4H_9OCOOC_{27}H_{45}$	Cholesterol *n*-butyl carbonate	78	90	**(8)**
$C_{33}H_{24}O_5$	$C_6H_5COOC_6H_4CH:C_5H_4O:CHC_6H_4O$-$COC_6H_5$	Di-(*p*-benzoxybenzal)-cyclopentanone	234	236	**(44)**
$C_{33}H_{56}O_2$	$C_5H_{11}COOC_{27}H_{45}$	Cholesterol capronate	91.2	100	**(18)**
$C_{34}H_{26}N_2O_7$	$C_6H_5COCH_2OCOCH:CHC_6H_4NON$-$C_6H_4CH:CHCOOCH_2COC_6H_5$	Phenacyl *p*-azoxycinnamate	231	238	**(40)**
$C_{34}H_{46}N_2O_5$	$C_8H_{17}OCOCH:CHC_6H_4NONC_6H_4$-$CH:CHCOOC_8H_{17}$	*n*-Octyl *p*-azoxycinnamate	94	175	**(40)**
$C_{34}H_{50}O_2$	$C_6H_5COOC_{27}H_{45}$	Cholesterol benzoate	146 ± 1	178.5 ± 0.3	**(18, 22, 30, 35, 42, 45)**
$C_{36}H_{40}N_2O_4$	$C_6H_4(CH:NC_6H_4CH:CHCOOC_5H_{11})_2$	*act*-Amyl *p*-phthalal-di-(*p*-aminocinnamate)	133, 195*	268	**(17)**
$C_{36}H_{50}N_2O_5$	$C_8H_{17}OCOCCH_3:CHC_6H_4NONC_6H_4$-$CH:CCH_3COOC_8H_{17}$	*n*-Octyl *p*-azoxy-α-methylcinnamate	41, 62*	85	**(20)**
$C_{37}H_{64}O_2$	$C_9H_{19}COOC_{27}H_{45}$	Cholesterol caprinate . . .	82.2	90.6	**(18)**
$C_{38}H_{44}N_2O_4$	$C_6H_4(CH:NC_6H_4CH:CCH_3COO$-$C_5H_{11})_2$	*act*-Amyl *p*-phthalal-di-(*p*-amino-α-methylcinnamate) . . .	144, 211*	248	**(17)**
$C_{40}H_{28}N_6O_6$	$(C_6H_4NHCOC_6H_4N:CHC_6H_4NO_2)_2$	Di-(*m*-nitrobenzal-*p*-aminobenzoyl)-benzidine.	>370	d.	**(45)**
$C_{40}H_{34}N_4$	$C_6H_5CH:NC_6H_4CH_2NHC_6H_4C_6H_4N$-$HCH_2C_6H_4N:CHC_6H_5$	Di-*p*-(benzalaminobenzyl)-benzidine.	217	246 d.	**(46)**
$C_{42}H_{38}N_4O_2$	$(C_6H_4NHCH_2C_6H_4N:CHC_6H_4OCH_3)_2$	Di-*p*-(anisalaminobenzyl)-benzidine	202 d.	d.	**(46)**
$C_{50}H_{78}N_2O_5$	$C_{16}H_{33}OCOCH:CHC_6H_4NONC_6H_4$-$CH:CHCOOC_{16}H_{33}$	*n*-Cetyl *p*-azoxycinnamate. . . .	105	141	**(40)**
$C_{52}H_{82}N_2O_5$	$C_{16}H_{33}OCOCCH_3:CHC_6H_4NONC_6H_4$-$CH:CCH_3COOC_{16}H_{33}$	*n*-Cetyl *p*-azoxy-α-methylcinnamate	77	84	**(20)**
$C_{55}H_{90}O_3$	$C_{27}H_{45}OCOOC_{27}H_{45}$	Cholesterol carbonate.	177	235	**(8)**
$C_{14}H_{12}ClHgNO$	$CH_3OC_6H_4CH:NC_6H_4HgCl$	*p*-Anisalaminophenylmercury chloride.	274	d.	**(46)**

Index formula	Formula	Name	Trans. temp.	M. P.	Lit.
$C_{15}H_{12}ClHgN$	$C_6H_5CH:CHCH:NC_6H_4HgCl$	*p*-Cinnamalaminophenylmercury chloride......	255	265	(46)
$C_{16}H_{15}HgNO_3$	$CH_3OC_6H_4CH:NC_6H_4HgOCOCH_3$	*p*-Anisalaminophenylmercury acetate	177	180	(46)
$C_{26}H_{18}HgN_4O_4$	$O_2NC_6H_4CH:NC_6H_4HgC_6H_4N:CHC_6H_4NO_2$	Mercury di-(*p*-nitrobenzalaminophenyl)	236	241	(46)
$C_{26}H_{20}HgN_2$	$C_6H_5CH:NC_6H_4HgC_6H_4N.CHC_6H_5$	Mercury di-(benzalaminophenyl)	180	184	(46)
$C_{28}H_{24}HgN_2$	$Hg(C_6H_4N:CHC_6H_4CH_3)_2$	Mercury di-(*p*-tolualaminophenyl)	217	229	(46)
$C_{28}H_{24}HgN_2O_2$	$Hg(C_6H_4N:CHC_6H_4OCH_3)_2$	Mercury di-(anisalaminophenyl)	209	285	(46)
$C_{30}H_{24}HgN_2$	$Hg(C_6H_4N:CHCH\ CHC_6H_5)_2$	Mercury di-(cinnamalaminophenyl)	208	269	(46)
$C_{30}H_{28}HgN_2O_2$	$Hg(C_6H_4N:CHC_6H_4OC_2H_5)_2$	Mercury di-(*p*-ethoxybenzalaminophenyl) .	204	272	(46)

LITERATURE

(For a key to the periodicals see end of volume)

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CRYSTALLOGRAPHY OF COMPOUNDS OF CARBON

George L. Keenan and Raymond M. Hann

Standard arrangement. For abbreviations, *see* p. 100. Literature, p. 338

𝔅-TABLE

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
16 *See* ℭ-Table								
18 $SiC_{24}H_{24}N_4$	Silico tetraphenylamide	M	Bi	--	17° 40′		Ax pl b (010); X∧c = 27½° in obtuse ∠β	(G)
$SiC_{28}H_{28}$	Tetra-*p*-tolylsilicane	M.	Bi	-		83° 30′	Ax. pl ⊥b(010)	(G)
$SnC_{14}H_{20}N_2Cl_6$	*p*-Toluidine tin chloride	M.	Bi.	+	77°		Ax. pl ⊥b(010); Z∧c = 19° in obtuse ∠β	(G)
23 $PbC_2H_2O_4$	Lead formate	R	Bi	–	70° 34′		Ax. pl. b(010), X∥c	(G)
$PbC_4H_6O_4.3H_2O$	Lead acetate	M	Bi	+	83° 55′		Ax. pl b(010), Z∧c = 55° 18′ in obtuse ∠β	(G)
$PbC_{18}H_{26}O_{10}S_2.6H_2O$	Lead sulfocamphylate	R	Bi	-		78° 17′	Ax. pl b(010), X∥c	(G)
27 TlC_2HO_4	Thallium acid oxalate	M	Bi	+		74° 5′ (red)	Ax. pl ⊥b(010)	(G)
$TlC_2HO_4.\frac{1}{2}H_2O$	Thallium acid oxalate	M	Bi	+		106° 5′ (red)	Ax pl b(010), Z∧c = 79° 36′ (red) in obtuse ∠β	(G)
$Tl_2C_4H_4O_6$	Thallium mesotartrate	Tri	Bi	+	73° 54′			(G)
$Tl_2C_4H_4O_6.\frac{1}{2}H_2O$	Thallium tartrate	R. (?)	Bi.	-		69°	Ax pl b(010), X∥c	(G)
$TlC_6H_2O_7N_3$	Thallium picrate ..	M	Bi.				Ax pl. b(010)	(G)
$Tl_2C_4H_4O_6$	Thallium *dl*-tartrate	M	Bi	+	88° 22′		Ax pl. b(010), Z∧c = 84° 44′ in obtuse ∠β	(G)
$Tl_2C_4H_4O_6$	Thallium tartrate	Trig	Un	+				(G)
$TlC_4H_4O_7Sb.H_2O$	Thallium antimonyl tartrate	R	Bi	–		20°–25°		(G)
28 $ZnC_4H_6O_4.3H_2O$	Zinc acetate	M	Bi.	+	84° 30′		Ax pl b(010), Z∧c = 54 75° in acute ∠β	(G)
$ZnC_8H_{14}O_4$	Zinc butyrate	M.	Bi.	+		Large		(37)
$ZnC_{16}H_{30}O_4$	Zinc methylethylvalerate	?	Bi.					(37)
$ZnC_5H_3O_4Br.8H_2O$	Zinc bromomesaconate	M	Bi	–	71° 21′	118° 15′	Ax. pl ⊥b(010); X∧c = 14° in obtuse ∠β	(G)
$ZnC_{10}H_6O_6S_2.6H_2O$	Zinc naphthalene-1, 5-disulfonate	M.	Bi		58° 16′		Ax. pl.∥(010); n_α∧c = 74°	(41)
$ZnC_{20}H_{32}N_2I_4$	Phenyldimethylethylammonium zinc iodide	M	Bi.	+	86° 52′		Ax. pl ⊥b(010); Z∧c = 43° in acute ∠β	(G)
$ZnC_9H_{22}ON_2Cl_4.3H_2O$	Triacetonediamine hydrochloride zinc chloride	M.	Bi.	+	36° 14′	58° 20′	Ax pl ⊥b(001); Z∧c = 49° in obtuse ∠β	(G)
30 $HgC_2H_8NI_3$	1, 1-Dimethylammonium mercuric iodide	M.	Bi	–	Large			(16)
$HgC_3H_{10}NI_3$	1, 1-Trimethylammonium mercuric iodide	R.	Bi.	–	Large			(16)
$HgC_4H_{12}NI_3$	1, 1-Diethylammonium mercuric chloride	R.	Bi.	+	Very large			(16)
$CuC_2H_2O_4.4H_2O$	Cupric formate .	M.	Bi.	–	34° 54′	55° 6′	Ax. pl. b(010); X∧c = 23° 35′ in obtuse ∠β	(G)
$CuC_{10}H_6O_6S_2.6H_2O$	Copper naphthalene-1, 5-disulfonate	M.	Bi.				Ax. pl ∥(010), n_α∧c = 75°	(14)

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
32 $AgC_4H_4O_3N_3$	Ethylene dicyanide silver nitrate	R	Bi	–	42° 36.5′		Ax. pl. c(001); $X\parallel b$	(G)
$AgC_4H_4O_{12}N_6$	Ethylene dicyanide silver nitrate	R	Bi	–	42° 41′		Ax. pl. c(001); $X\parallel a$	(G)
$AuC_{14}H_{14}SCl$	Gold dibenzylsulfine chloride (metastable form)	Tet	Un					(G)
$AuC_5H_{12}NCl_4$	Piperidine chloroaurate	R	Bi	+		70° 40′	Ax pl. b(010); $Z\parallel c$	(G)
$AuC_5H_{12}O_2NCl_4.H_2O$	δ-Aminovaleric acid chloroaurate	M	Bi	–		70° (apprx.)	Ax pl $\perp$ b(010); $X\wedge c = 91.5°$ in obtuse $\angle\beta$	(G)
$AuC_9H_{16}NCl_4$	3, 4, 5, 6-Tetramethyl-1, 2-dihydropyridine hydrochloride chloroaurate	M	Bi	+		91° (apprx.)	Ax. pl $\perp$ b(010)	(G)
$K_3IrC_2O_4Cl_4.H_2O$	Iridium tetrachloro tripotassium oxalate	R	Bi	–		94° 40′	Ax pl (010), $Bx_a \perp (001)$	(22)
37 $PtC_2H_{12}N_2Cl_6$	Methylammonium chloroplatinate	C						(21)
$PtC_{10}H_{12}N_2Cl_6$	Pyridine chloroplatinate	Tri	Bi	-		50° 54′	Ax pl nearly $\perp$ c-axis	(G)
$PtC_{10}H_{28}O_2N_2Cl_6$	Choline chloroplatinate	M	Bi	+		25° 52′	Ax pl $\perp$ b(010); $Z\wedge c = 75° 12′$ in acute $\angle\beta$	(G)
$PtC_{12}H_{16}N_2Cl_6$	α-Picoline chloroplatinate	M	Bi	–		93° 13.5′	Ax pl b(010)	(G)
$PtC_{18}H_{22}N_8Cl_6$	1-Phenyl-3-imino-5-methyl triazoline chloroplatinate	M	Bi				Ax pl b(010); Z nearly $\perp$ c(001)	(G)
$PtC_{12}H_{24}O_4N_2Cl_6\ 2H_2O$	Pipecolinic acid chloroplatinate	M	Bi			66° 56′	Ax pl b (010)	(G)
$PtC_{12}H_{28}O_4N_2Cl_6$	α-Homobetaine chloroplatinate	M	Bi	+	88° 12′		Ax pl b(010), $Z\wedge c = 90°$ in obtuse $\angle\beta$	(G)
$PtC_{14}H_{20}N_2Cl_6$	Ethyl pyridine chloride chloroplatinate	R	Bi	–		44°	Ax pl a(100), $X\parallel c$	(G)
$PtC_{14}H_{36}N_2Cl_6$	Dipropyl carbinol amine chloroplatinate	M	Bi	–		72° 40′	Ax pl $\perp$ b(010); X nearly $\perp$ c (001)	(G)
$PtC_{16}H_{32}O_2N_2Cl_6$	Tropanine chloroplatinate	M	Bi		52° 12′		Ax pl $\perp$ b(010)	(G)
$PtC_{18}H_{32}N_2Cl_6$	Tropidine chloromethylate chloroplatinate	R	Bi.	+		70°	Ax pl b(010); $Z\parallel c$	(G)
$PtC_{16}H_{40}N_2Cl_6$	Ethyldipropyl ammonium chloroplatinate	R	Bi.			61° 26′	Ax pl c(001); $Z\parallel a$	(G)
$PtC_{20}H_{36}N_2Cl_6$	Anhydrolupinin chloroplatinate (stable mod.)	M	Bi			38° (apprx.)	Ax pl $\perp$ b(010)	(G)
$PtC_{22}H_{36}N_2Cl_6$	Diethyl-p-toluidine chloroplatinate	R	Bi	+	63° 0′		Ax pl a(100), $Z\parallel b$	(G)
39 $RuN_3H_{16}O_2Cl_5$	Ruthenium ammonium chloral hydrate	M	Bi		56° 20′			(L-B)
$MnC_{12}H_4O_{14}N_6\ 5H_2O$	Manganese picrate	R	Bi	–		15° 30′	Ax pl. b(010); $X\parallel c$	(G)
43 $FeC_{12}H_4O_{14}N_6\ 5H_2O$	Ferrous picrate .	R	Bi.	-		24° 48′	Ax pl a(100); $X\parallel c$	(G)
$FeC_{15}H_{21}O_6$	Ferriacetylacetone .	R	Bi	-		50° (apprx.)	Ax pl a(100); $X\parallel c$	(G)
$FeC_{20}H_{14}O_6S_2.6H_2O$	Ferrous naphthalene-β-sulfonate		Bi	+				(1)
44 $CoC_4H_6O_4.4H_2O$	Cobalt acetate	M	Bi.	–	30° 13′	48° 12′	Ax pl b(010); $X\wedge c = 53.5°$ in acute $\angle\beta$	(G)
$CoC_6H_{24}N_6I_3.H_2O$	d-Luteo triethylenediamine cobalt iodide	R	Bi	+		Small	Ax pl (001); Bx_a = b-axis	(15)
$CoC_6H_{24}N_6I_3.H_2O$	dl-Luteo triethylenediamine cobalt iodide	R	Bi			Small	Ax pl (010), Bx_a = c-axis	(15)
$CoC_{10}H_6O_6S_2.6H_2O$	Cobalt naphthalene-1, 5-disulfonate	M	Bi		61° 40′		Ax pl $\parallel$(010); $\eta_\alpha \wedge c = 72° 0.5′$	(41)
$NiC_{10}H_6O_6S_2\ 6H_2O$	Nickel naphthalene-1, 5-disulfonate	M	Bi		59° 56′		Ax pl $\parallel$(010); $\eta_\alpha \wedge c = 74°$	(41)
49 $UC_6H_{13}O_8N$	Ammonium uranyl acetate	Tet	Un					(G)
$UCdC_8H_{12}O_{10}\ 6H_2O$	Cadmium uranylacetate	R	Bi	–		57° 54′ (red)	Ax. pl. a(100)	(G)
$UMnC_8H_{12}O_{10}.6H_2O$	Manganese uranyl acetate	R	Bi	–		31°	Ax pl. a(100)	(G)
$(UO_2)_2CoC_{12}H_{18}O_{12}\ 7H_2O$	Cobalt diuranyl acetate	R	Bi	–		103° 30′	Ax. pl. c(001)	(G)
55 $Al_2C_{12}O_{12}\ 18H_2O$	Mellite	Tet	Un.					(35)
$YtC_{12}H_{30}O_{24}S_6\ 18H_2O$	Yttrium ethyl sulfate	H	Un					(34)
$YC_{18}H_{12}O_{15}N_3S_3\ 7H_2O$	Yttrium m-nitrobenzenesulfonate	M	Bi.	+			Ax pl b(010); $Z\wedge c = 85°$ in obtuse $\angle\beta$	(G)
58 $LaC_{12}H_{30}O_{24}S_6\ 18H_2O$	Lanthanum ethyl sulfate	H	Un					(34)
$CeC_{12}H_{30}O_{24}S_6\ 18H_2O$	Cerium ethyl sulfate	H	Un					(34)
60 $PrC_{12}H_{30}O_{24}S_6\ 18H_2O$	Praseodymium ethyl sulfate	H	Un					(34)
$NdC_{12}H_{30}O_{24}S_6\ 18H_2O$	Neodymium ethyl sulfate	H	Un					(34)
63 $SaC_{12}H_{30}O_{24}S_6\ 18H_2O$	Samarium ethyl sulfate	H	Un					(34)
$EuC_{12}H_{30}O_{24}S_6\ 18H_2O$	Europium ethyl sulfate	H	Un					(34)
$GdC_{12}H_{30}O_{24}S_6.18H_2O$	Gadolinium ethyl sulfate	H	Un					(34)
67 $DyC_{12}H_{30}O_{24}S_6\ 18H_2O$	Dysprosium ethyl sulfate	H	Un					(34)
$ErC_{12}H_{30}O_{24}S_6\ 18H_2O$	Erbium ethyl sulfate	H	Un					(34)
$TmC_{12}H_{30}O_{24}S_6\ 18H_2O$	Thulium ethyl sulfate	H	Un					(34)
$YbC_{12}H_{30}O_{24}S_6\ 18H_2O$	Neoytterbium ethyl sulfate	H	Un					(34)
75 $BeC_4H_8O_8N_2$	Ammonium beryllium oxalate	M.	Bi			27° 47′	Ax. pl. b(010), $Z\wedge c = 37.5°$ in obtuse $\angle\beta$	(G)
$Be_2C_4H_{10}O_9S_2\ 4H_2O$	Diethyl beryllium sulfate (basic)	Tet	Un					(34)
$MgC_4H_6O_4\ 4H_2O$	Magnesium acetate .	M	Bi	–	50° 34′	89° 54′	Ax. pl b(010); $X\wedge c = 48.25°$ in acute $\angle\beta$	(G)
$MgC_6H_{10}O_6.2.5H_2O$	Magnesium dilactate.	M	Bi	+		79° (apprx.)	Ax. pl. b(010)	(G)
$MgC_4H_4O_6\ 6H_2O$	Magnesium dl-tartrate	M	Bi.	–		102°	$Bx_a \wedge c = 30°$ in acute $\angle\beta$	(17)
$MgC_{10}H_6O_6S_2\ 6H_2O$	Magnesium naphthalene-1, 5-disulfonate	M.	Bi		52° 20′		Ax pl.$\parallel$(010); $\eta_\alpha \wedge c = 73° 0.5′$	(41)
77 $CaC_2O_4.H_2O$	Calcium oxalate. . . .	M.	Bi	+	80°		Ax pl. b(010); $Z\wedge c = 64.25°$ in acute $\angle\beta$	(G)
$CaC_2H_2O_4$	Calcium formate	R.	Bi	+	20° 47′	41° 2′	Ax. pl. b(010); $Z\parallel a$	(G)
$CaC_3H_2O_4.2H_2O(?)$	Calcium malonate	?	Bi.	+		moderate		(37)
$CaC_4H_2O_4.2H_2O$	Calcium fumarate	R.	Bi.	–	22° 24′	37° (apprx.)	X = a, Y = b, Z = c	(38)
$CaC_4H_2O_4\ H_2O$	Calcium maleate	R	Bi	–	77° 30′ (calc.)	164° (calc.)	X = c, Y = a, Z = b	(38)

	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit
	$CaC_4H_4O_5\,3H_2O$	Calcium malate	R	Bi.	+			Ax. pl. b(010); Z‖a	(37)
	$CaC_4H_4O_4\,3H_2O$	Calcium succinate	?	Bi			Very large		(37)
	$CaC_4H_4O_6.3H_2O$	Calcium mesotartrate	M	Bi.	−(?)		Very large	Ax. pl b(010)	(G, 37)
	$CaC_8H_{10}O_4$	Calcium crotonate	(?)	Bi.	−				(37)
	$CaC_8H_{10}O_{10}.6H_2O$	Calcium acid malate	R	Bi	+		109° 6′ (red)	Ax. pl. a(100); Z‖c	(G)
	$Ca_3C_{12}H_6O_{12}$	Calcium aconitate	?	Bi			100° (apprx.)		(37)
	$Ca_3C_{12}H_{10}O_{14}\,4H_2O$	Calcium citrate	?	Bi					(37)
	$CaC_8H_4O_{10}N_2\,(?)H_2O$	Calcium nitrotetronate(?)	M	Bi.		32° 26′		Ax pl. ⊥b(010); Z nearly ⊥a (100)	(G)
	$Ca_2PbC_{18}H_{30}O_{12}$	Dicalcium lead propionate	Tet	Un	+				(G)
	$CaPbC_{42}H_{100}O_{34}\,12H_2O$	Tetracalcium butyrate pentalead propionate	C						(G) (G)
	$CaCuC_8H_{12}O_8.6H_2O$	Calcium cupric acetate	Tet	Un					
78	$SrC_2H_2O_4$	Strontium formate	R	Bi	+	74° 14′	143° 36′	Ax pl. a(100); Z‖b	(G)
	$SrC_2H_2O_4\,2H_2O$	Strontium formate	R	Bi	−	66° 59.33′	114° 8′	Ax. pl. b(010), X‖c	(G)
	$SrC_2H_4O_6S_2\,H_2O$	Strontium disulfonate	M	Bi			Large	Ax. pl ⊥(010)	(6)
	$SrC_4H_{10}O_8S_2\,2H_2O$	Strontium ethyl sulfate	M.	Bi		75° 4′		Ax. pl. ⊥b(010); Z∧c = 70° in acute ∠β	(G)
	$SrC_8H_4O_{10}N_2\,(?)H_2O$	Strontium nitrotetronate	M	Bi		30° 23′		Ax pl b(010); X ⊥a(100)	(G)
	$SrC_8H_8O_{14}Sb_2$	Strontium antimonyl tartrate	H	Un	−				(G)
	$Sr_2CuC_6H_6O_{12}\,8H_2O$	Cupric strontium formate	Tri	Bi		72° 4′			(L-B)
	$SrCa_2C_{18}H_{30}O_{12}$	Dicalcium strontium propionate	Tet	Un	+				(G)
79	$BaC_2H_2O_4$	Barium formate	R	Bi	+	77° 54 33′		Ax. pl. b(010); Z‖a	(G)
	$BaC_4H_4O_6\,5H_2O$	Barium *dl*-tartrate	M	Bi	+	93° 1′		Ax. pl. ⊥b(010)	(G)
	$BaC_4H_6O_4\,H_2O$	Barium acetate	Tri	Bi					(18)
	$BaC_6H_{10}O_4\,H_2O$	Barium propionate	R	Bi	−	81° 36′		Ax. pl. a(100); X‖b	(G)
	$BaC_{12}H_{22}O_{14}\,(?)H_2O$	Barium *d*-galactonate	M.	Bi			77° 37′	Ax. pl. ⊥b(001); Z‖b	(G)
	$BaC_{16}H_{14}O_6.4H_2O$	Barium methyluvinate	R.	Bi.		88° 12′		Ax. pl. a(100), Z‖b	(G)
	$BaC_6H_4O_6S_2\,2H_2O$	Barium *m*-benzenedisulfonate	R	Bi.		62° 19′ (red)		Ax pl. a(100); Z‖c	(G)
	$BaC_6H_4O_7S_2\,4H_2O$	Barium phenol-2, 4-disulfonate	M	Bi	−	61° 58′		Ax pl ‖a(100), X∧c = 5° 20′ in acute ∠β	(G)
	$BaC_2H_2N_8.3.5H_2O$	Barium tetrazole	R	Bi.			40° (apprx)	Ax pl a(100); Z‖c	(G)
	$BaC_6H_2O_8N_2S\,3.5H_2O$	Barium dinitrophenol sulfonate	M	Bi	-		72° 13′	Ax pl b(010); X∧c = 77° in acute ∠β	(G)
	$BaC_6H_8O_6N_2.2H_2O$	Barium methyloxamate	M.	Bi.	+		40° (apprx)	Ax pl. b(010), Z∧c = 8° in obtuse ∠β	(G)
	$BaC_{10}H_{10}O_4N_4\,1.5H_2O$	Barium methylpyrazole carbonate	Tri	Bi		56° 42′		Ax pl ⊥b(010)(apprx)	(G)
	$BaC_{12}H_{24}O_8P_2\,2H_2O$	Barium diacetonephosphinate	R.	Bi	+		122° 44′	Ax pl b(010), Z‖c	(G)
	$BaC_{26}H_{20}O_8N_2S_2$	Barium *p*-amidobenzophenone-*p*-sulfonate	M.					Ax pl ‖(010)	(5)
	$BaCdC_4H_4O_8\,2H_2O$	Barium cadmium formate	M.	Bi	+	67° 36′	117°	Ax pl ⊥b(010), Z∧c = 46° 23′ in acute ∠β	(G)
	$Ba_2CuC_6H_6O_{12}$	Barium copper formate	R.	Bi	+		70°	Ax pl b(010)	(G)
	$BaCa_2C_{18}H_{30}O_{12}$	Dicalcium barium propionate	C.						(G)
81	$LiC_4H_5O_5\,5H_2O$	Monolithium malate	M.	Bi	−		100°	Ax pl b(010)	(G)
	$Li_2C_{10}H_6O_6S_2\,2H_2O$	Lithium naphthalene-1, 5-disulfonate	M.	Bi		23°		Ax. pl. ⊥(010)	(41)
	$LiC_4H_8O_6N\,H_2O$	Ammonium lithium tartrate	R.	Bi	+	87° 6′			(G)
	$LiC_4H_8O_6N\,H_2O$	Lithium ammonium *dl*-tartrate	M.	Bi	+	81° 42′		Ax. pl. b(010); Z∧c = 76.5° in obtuse ∠β	(G)
	$LiTlC_4H_4O_6.H_2O$	Lithium thallium tartrate	R	Bi.	+		24° 40′ (red)	Ax. pl. c(001)(red); Z‖b	(G)
	$Li_6Cr_2C_{12}O_{24}\,18(?)H_2O$	Lithium chromic oxalate	R	Bi	−		95° 26′	Ax pl. b(010); X‖c	(G)
	$LiUO_2C_6H_9O_6\,5H_2O$	Lithium uranyl acetate	M	Bi	−		65° 14′	Ax pl b(010); X∧c = 12° in obtuse ∠β	(G)
	$Li_6Al_2C_{12}O_{24}.12H_2O$	Lithium aluminum oxalate	Tri	Bi	−		100° 30′	Ax pl ⊥b(010)	(G)
82	$NaC_2H_3O_2\,3H_2O$	Sodium acetate	M	Bi	−	62° 50′		Ax pl. ⊥b(010); X∧c = 44° in acute ∠β	(G)
	$NaC_3H_3O_4\,H_2O$	Sodium acid malonate	R	Bi	−	39° 20′	55° 21′	Ax pl. a(100), X‖c	(G)
	$NaC_4H_5O_6.H_2O$	Sodium *dl*-tartrate	R	Bi	+	51° 31′ (red)	83° 34′ (red)	Ax. pl. a(100); Z‖c	(G)
	$NaC_4H_7O_4$	Sodium diacetate	C						(G)
	$NaC_5H_5O_4$	Sodium citraconate	M	Bi.	−	53° 25′ (red)		Ax. pl. b(010)	(G)
	$NaC_8H_5O_4$	Sodium acid phthalate.	R	Bi			30° (apprx.)	Ax. pl. c(001)	(G)
	$NaC_{15}H_{19}O_4\,3.5H_2O$	Sodium santonate	R	Bi.	−		51° 46′	Ax. pl. a(100); X‖b	(G)
	$NaC_{15}H_{21}O_4.3H_2O$	Sodium hydrosantonate	R	Bi.	+		37° 24′ (red)	Ax. pl. a(100); Z‖c	(G)
	$NaC_6H_5O_4S\,2H_2O$	Sodium *p*-phenolsulfonate	M	Bi.	+	69° 58′	125° 47′	Ax pl. b(010); Z∧c = 9° in obtuse ∠β	(G)
	$NaC_7H_5O_5S\,2H_2O$	Sodium *m*-sulfobenzoate	Tri	Bi.	−		86° 7′	X ⊥b(010)	(G)
	$NaC_8H_9O_3S$	Sodium *p*-xylenesulfonate	R	Bi.	−		27° 46′	Ax. pl. c(001); X‖b	(G)
	$Na_2C_2H_4O_6S_2\,2H_2O$	Sodium ethane disulfonate	M	Bi.			Large	Ax. pl (010)	(6)
	$Na_2C_{10}H_6O_6S_2\,2H_2O$	Sodium naphthalene-1, 5-disulfonate	M	Bi.	−	24° 0 5′		Ax pl. ⊥(010)	(41)
	$Na_2CH_2O_4N_4$	Sodium diisonitramidomethane	M	Bi.	−	89° 20′		Ax. pl. b(010); X∧c = 43.66° in acute ∠β	(G)

Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit.
$NaC_4H_6O_4N.H_2O$	Sodium aspartate	M	Bi			31° 30′	Ax pl. b(010); Z∧c = 51° in acute ∠β	(G)
$NaC_4H_8O_6N.H_2O$	Sodium ammonium *dl*-tartrate	M	Bi	−	44° 20′		Ax. pl. ⊥b(010)	(G)
$NaC_4H_8O_6N.4H_2O$	Sodium ammonium tartrate	R	Bi	−	59° 52′	96° 30′	Ax. pl a(100); X∥c	(G)
$NaTlC_4H_4O_6.4H_2O$	Sodium thallium tartrate	R	Bi.	−		75° 49′-76° 47′ (red)	Ax pl. a(100); X∥c	(G)
$NaC_5H_8O_4N$	Sodium acid glutamate	M	Bi		63° 3.5′		Ax. pl. ⊥b(010), Z⊥γ(10$\bar{2}$)	(G)
$NaC_6H_6O_3NS\ 2H_2O$	Sodium sulfanilate	R	Bi	+	65° 21′	115° 24′	Ax pl b(010), Z∥c	(G)
$NaC_{10}H_8O_3NS\ 4H_2O$	Sodium naphthalenesulfonate (stable)	M	Bi	+	69° 10′		Ax pl b(010), Z∧c = 3° 35′ in acute ∠β	(G)
$NaTl_3C_8H_8O_{12}$	Sodium trithallium tartrate	R	Bi	+		75° 40′	Ax pl c(001); Z∥b	(G)
$NaCuC_{18}H_{27}O_{24}\ 9H_2O$	Sodium cupric triuranyl acetate	M	Bi	+		90° 50′	Ax pl ⊥b(010)	(G)
$Na_6Fe_2C_{12}O_{24}\ 10H_2O$	Sodium ferric oxalate	M	Bi	−	30° 0′	46° 53′	Ax pl b(010), X∧c = 12° in obtuse ∠β	(G)
$Na_3Cr_2C_{12}H_{12}O_{24}N_3\ 7H_2O$	Sodium ammonium chromic oxalate	M	Bi	−		98° 20′	Ax pl. ⊥(010)	(G)
$NaUC_6H_9O_8$	Sodium uranyl acetate	C						(G)
$NaU_3MnC_{18}H_{27}O_{24}\ 9H_2O$	Sodium manganese triuranyl acetate	M	Bi	-		105° 30′	Ax pl ⊥b(010), X∧c = 70.5° in obtuse ∠β	(G)
$Na_3Al_2C_6H_{12}O_{12}N_3\ 7H_2O$	Sodium ammonium aluminum oxalate	M	Bi	-		134°	Ax pl ⊥b(010); X∧c = 76° in obtuse ∠β	(G)
$Na_3Al_2C_{12}H_{12}O_{24}N_3\ 7H_2O$	Sodium ammonium aluminum oxalate	M	Bi					(21)
$Na_6Al_2C_{12}O_{24}\ 10H_2O$	Sodium aluminum oxalate	M	Bi	−		83° 30′	Ax pl b(010); X∧c = 7.5° in obtuse ∠β	(G)
$Na_{24}Al_{32}C_{72}H_{300}O_{96}N_{48}$	Ammonium sodium aluminum oxalate	Tri	Bi	−		138°	Ax pl ⊥(001); Bx$_a$ ⊥(001)	(21)
$NaLiC_4H_4O_6\ 2H_2O$	Sodium lithium *dl*-tartrate	M	Bi	-	68° 57′ (red)		Ax pl b(010); X∧c = 34.5° in obtuse ∠β	(G)
83 $K_2C_2O_4\ H_2O$	Potassium oxalate	M	Bi		82°	156°	Ax pl b(010), X∧c = 40° 45′ in obtuse ∠β	(G)
KC_2HO_4	Potassium acid oxalate	M	Bi	-	40°	64′	Ax. pl ⊥b(010), X⊥a(100)	(G)
$KC_2HO_4\ H_2O$	Potassium acid oxalate	R	Bi	−		75° 10′	Ax pl c(001); X∥b	(G)
$KC_4H_5O_4$	Potassium acid succinate	M	Bi			113°	Ax pl ⊥b(010)	(G)
$KC_4H_5O_4.2H_2O$	Potassium acid succinate	R	Bi				Ax pl c(001), Z∥a	(G)
$KC_4H_5O_6$	Potassium acid tartrate	R	Bi			161° 10′	Ax pl c(001); X∥b	(G)
$KC_8H_{11}O_8$	Potassium acid disuccinate	M	Bi	-		122° 50′	Ax pl ⊥b(010); X∧c = 44° in obtuse ∠β	(G)
$K_2C_4H_4O_6\ \frac{1}{2}H_2O$	Potassium tartrate	M	Bi	-	62°	102° 16′ (red)	Ax pl ⊥b(010)	(G)
$K_2C_4H_4O_6\ 2H_2O$	Potassium *dl*-tartrate	M	Bi	-		130° 2′ (red)		(G)
$K_4C_8H_3O_{12}\ 2H_2O$	Potassium tetraoxalate	R	Bi	-			Bx$_a$ ⊥(001)	(12)
$K_6C_{12}O_{12}\ 9H_2O$	Potassium mellitate	R	Bi	−		73° 30′	Ax pl b(010); X∥c	(G)
KCH_3O_4S	Potassium formaldehyde sulfite	M	Bi	+		98° 18′	Ax pl. b(010)	(G)
$KC_6H_5O_4S$	Potassium phenolsulfonate	R	Bi	+	69° 4′ (apprx.)		Ax pl c(001), Z∥b	(G)
$KC_6H_5O_4S\ 2H_2O$	Potassium phenolsulfonate	R	Bi	+			Ax pl a(100); Z∥c	(G)
$KC_6H_5O_4S$	Potassium phenylsulfate	R	Bi	+		87° 58′	Ax pl b(010), Z∥c	(G)
$KC_7H_7O_3S\ H_2O$	Potassium *p*-toluenesulfonate	R	Bi	−	67° 4′		Ax pl a(100), X∥b	(G)
$K_2CH_2O_6S_2$	Potassium methanedisulfonate	M	Bi		72°		Ax pl ⊥b(010), Z∧c = 41° in obtuse ∠β	(G)
$K_2C_6H_4O_6S_2\ H_2O$	Potassium *m*-benzenedisulfonate	M	Bi.			96° (apprx.)	Ax pl ⊥b(010)	(G)
$K_2C_6H_4O_7S_2\ H_2O$	Potassium phenoldisulfonate	R	Bi	-	65° 35′		Ax pl. b(010); X∥a	(G)
$KC_6H_4O_3SCl$	Potassium *p*-chlorobenzenesulfonate	M	Bi		81° 25′ (red)		Z∥b	(G)
$K_2C_{10}H_6O_6S_2\ 2H_2O$	Potassium napthalene-1, 5-disulfonate	M	Bi		38° 50′		Ax pl. ⊥(010); n_α∧c = 78°	(41)
$KC_8H_6O_3N$	Potassium phthalaminate.	R	Bi	−		21° 2′	Ax pl b(010); X∥a	(G)
$KC_7H_3O_6N_2$	Potassium 3, 5-dinitrobenzoate	M	Bi	−		55° 25′	Ax pl. b(010); X∧c = 65° in acute ∠β	(G)
$KC_6H_2O_7N_3$	Potassium picrate	R	Bi	−	33° 34′	67° 39′	Ax pl a(100), X∥c	(G)
$KC_4H_3N_4O_6$	Potassium acid uroxanate		Bi					(21)
$KC_4H_4O_7Sb.H_2O$	Potassium antimonyl tartrate	R	Bi	−	42° 34′	72° 50′	Ax pl. c(001), X∥b	(G)
$K_2IrC_4O_8Cl_2\ H_2O$	Potassium iridium chloroxalate	M	Bi	+	76° 23′		Ax. pl b(010); Z∧c = 13° 53′ in obtuse ∠β	(G)
$K_2PtC_2O_8N_2\ H_2O$	Potassium platino nitrito oxalate	M	Bi		89° 40′		Ax pl ⊥b(010)	(G)
$K_6Fe_2C_{12}O_{24}\ 6H_2O$	Potassium ferric oxalate	M	Bi	−	80° 4′ (red)		Ax pl b(010), X∧c = 1.25° in obtuse ∠β	(G)
$K_2NiC_4O_4S_4$	Potassium nickel dithioxalate	M	Bi					(27)
$KCaC_8H_8O_{17}Sb_2N\ H_2O$	Calcium antimonyl tartrate potassium nitrate	R	Bi			64° 1′	Ax. pl a(100); Z∥b	(G)
$KLiC_2H_4O_6S_2\ H_2O$	Lithium potassium ethanedisulfonate	M	Bi			82°	Ax pl. (010); Bx$_a$ ⊥(001) = 41° in obtuse ∠β	(8)
$KLiC_4H_4O_6\ H_2O$	Lithium potassium tartrate	R	Bi	−	73° 58′		Ax pl b(010); X∥a	(G)
$KNaC_4H_4O_6\ 4H_2O$	Sodium potassium tartrate	R	Bi	+	69° 40′	117° 2′	Ax pl. b(010); Z∥a	(G)
$KNaC_8H_8O_{16}SbN\ H_2O$	Potassium antimonyl tartrate sodium nitrate	R	Bi	−		90° 45′	Ax pl c(001), X∥a	(G)
$KNaC_{16}H_{16}O_{28}SbN\ 2H_2O$	Potassium antimonyl tartrate sodium nitrate	R	Bi.	−		88° 37′	Ax pl b(010); X∥c	(G)
$K_2NaIrC_2O_6Cl_2\ 2H_2O$	Potassium sodium iridium chloronitrito oxalate	R	Bi.	+		63° 24′	Ax. pl a(100); Z∥b	(G)

	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit
84	$Rb_2C_4H_4O_6.2H_2O$	Rubidium *dl*-tartrate	M	Bi	–	56° 6′		Ax. pl. b(010); X∧c = 82° 18′ in acute ∠β	(G)
	$Rb_2C_4H_4O_6\ H_2O$	Rubidium mesotartrate	Tri	Bi	–	75° 18′		Ax. pl. 19° with c-axis	(G)
	$Rb_6Al_2C_{12}O_{24}\ 6H_2O$	Rubidium aluminium oxalate	M	Bi	–	80° 22′		Ax. pl. (010)	(G)
	$RbLiC_4H_4O_6\ H_2O$	Lithium rubidium tartrate	R	Bi	–	57° 10′ (red)		Ax. pl. c(001); X∥a	(G)
	$Rb_3Na_3Cr_2C_{12}O_{24}\ 7H_2O$	Sodium rubidium chromic oxalate	M	Bi	–		56°	Ax pl. b(010); X⊥c(001)	(G)
	$Rb_{14}Na_{16}Al_{10}C_{60}O_{120}\ 23H_2O$	Sodium rubidium aluminium oxalate	M	Bi	–		24° 30′	Ax. pl. b(010); X⊥(001)	(G)

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Index No	Formula	Name	System	Class	Sign	2V	2E	Orientation	Lit
21	CHI_3	Iodoform	H	Un	–				(G)
55	CH_4ON_2	Urea	Tet	Un					(G)
58	CH_4N_2S	Thiourea	R	Bi	–		69° 54′- 70° 59′	Ax pl a(001); X∥b	(G)
64.1	CH_5O_3As	Methyl arsenate	M	Bi	–	14° 24′		Ax. pl. ⊥b(010); X∧c = 53° 20′ in acute ∠β	(G)
70	$CH_5O_4N_3$	Urea nitrate	M	Bi.	–		23° 10′	Ax pl. b(010), X⊥c(001)	(G)
	$CH_{10}O_6N_2S_2$	Ammonium methanedisulfonate	M	Bi	–	79° 34′		Ax. pl. ⊥b(010), X∧c = 39° in obtuse ∠β	(G)
84.1	$C_2Cl_4Br_2$	1, 2-Dibromo-1, 1, 2, 2-tetrachloroethane	R	Bi	–		87° 45′	Ax. pl a(100); X∥c	(G)
87	C_2Br_6	Hexabromoethane	R	Bi	–		79° 30′	Ax. pl. a(100); X∥c	(G)
92	C_2Cl_6	Hexachloroethane	R	Bi	–		66° 28′	Ax. pl. a(100)	(G)
	$C_2O_2N_2I_2$	Diiodofuroxane	R	Bi		63° 38′		Ax pl. c(001); Z∥a	(G)
147	$C_2H_2O_4$	Oxalic acid	R	Bi	+			Ax. pl. c(001); Z∥b	(G)
	$C_2H_2O_4\ 2H_2O$	Oxalic acid	M	Bi	–	68°		Ax. pl. ⊥b(010), X∥b	(G)
161	$C_2H_3O_2Cl_3$	Chloral hydrate	M	Bi	-	20° 48′	35° (apprx.)	Ax. pl b(010); X∧c = 58° 45′ in obtuse ∠β	(G)
238	C_2H_5ON	Acetamide (Unst. mod.)	?	Bi.			120° (apprx.)		(^{37})
238	C_2H_5ON	Acetamide (St. mod.)	Trig	Un	–				(G)
248	$C_2H_5O_4N\ H_2O$	Ammonium hydrogen oxalate	R	Bi	–		22° 32′	Ax. pl. a(100); X∥c	(G)
	$C_2H_6O_2NCl$	Glycocoll hydrochloride	R	Bi	–		63° 50′	Ax pl. a(100); X∥b	(G)
303	$C_2O_4H_8N_2.H_2O$	Ammonium oxalate	R	Bi	–	61° 44′	110° 8′	Ax pl a(100); X∥c	(G)
306	$C_2H_{10}N_2Cl_2$	Ethylenediamine hydrochloride	M	Bi.	–	81° 4′		Ax. pl b(010); X∧c = 6° in acute ∠β	(G)
308.1	$C_3N_3Cl_3$	Cyanuric trichloride	M	Bi			28°	Ax pl. ⊥b(010)	(G)
313.1	$C_3H_2ON_2Br_2$	Dibromocyanacetamide	M	Bi	+		29° 52′	Ax. pl ⊥b(010); Z∧c = 31° in obtuse ∠β	(G)
	$C_3H_3N_2Cl$	4-Chloropyrazole	R	Bi	+		100° (apprx.)	Ax. pl. a(100)	(G)
	$C_3H_4O_3Br_2\ H_2O$	Dibromopyroracemic acid	M	Bi	+		34° 9′	Ax pl ⊥b(010)	(G)
	$C_3H_4ON_2S$	Pseudothiohydantoin	R	Bi	–		81° 30′	Ax pl a(100), X∥b	(G)
	$C_3H_4O_3N_2S$	Pyrazol-4-sulfonic acid	Tet	Un.					(L-B)
436	$C_3H_6O_2N_2$	Malonamide (metast. mod.)....	Tet	Un.	–				(G)
444	$C_3H_6O_3N_4$	Ammonium fulminurate	M	Bi					(G)
	$C_3H_7O_2N$	β-Alanine	R	Bi	–		70° (apprx.)	Ax. pl. c(001); X∥b	(G)
	$C_3H_{10}NBr$	Trimethyl ammonium bromide	M	Bi	+		50° (apprx.)	Ax. pl. (010)	(G)
	$C_3H_{10}NI$	Trimethyl ammonium iodide	M	Bi	+		53° (apprx.)	Ax. pl. (010)	(G)
535	$C_3H_{12}O_3N_6$	Guanidine carbonate	Tet	Un					(G)
	$C_4H_3O_2NBr_2$	Dibromosuccinimide	M	Bi	+		20° 50′	Ax. pl. b(010); Z∧c = 8° in obtuse ∠β	(G)
579.1	$C_4H_3O_5N\ 2H_2O$	Nitrotetronic acid	M	Bi				Ax pl. b(010)	(G)
	$C_4H_4O_2Br_2$	*trans*-α-β-Dibromocrotonic acid	M	Bi			56° 1′	Ax. pl. ⊥b(010)	(G)
	$C_4H_4O_2N_2$	Mesotartaric acid nitrile	M	Bi	+		50° (apprx.)		(G)
	$C_4H_5O_2Cl$	α-Chlorocrotonic acid	M	Bi.	+		68° 17′	Ax pl ⊥b(010), Z∧c = 35° in obtuse ∠β	(G)
592	$C_4H_5O_2N$(St. mod.)	Succinimide	R	Bi.			90°	Ax pl. (010); Bx_a ⊥(010)	(^{28})
602	$C_4H_6Br_4$	Butadiene tetrabromide	R	Bi.	+		57° (apprx.)	Ax pl. a(100); Z∥c	(G)
	$C_4H_8O_2NCl_3$	Ammonium trichloroisobutyrate	R	Bi	+		96°	Ax pl. c(001)	(G)
	$C_4H_6O_3N_2S$	3-Methylpyrazole-4-sulfonic acid	M	Bi		53°	92°	Ax. pl. ⊥b(010); Z∥b	(G)
610	$C_4H_6O_3N_4$	Allantoin	H	Un					(^{21})
	$C_4H_6O_4Se$	Selenodiglycolic acid	M	Bi		78° 30′		Ax. pl b(010); Z∧c = 41° in obtuse ∠β	(G)
640	$C_4H_6O_6\ H_2O$	*dl*-Tartaric acid	Tri	Bi		67° 10′		Ax. pl. ∥p(110)	(G)
	$C_4H_7O_4N$	*dl*-Aspartic acid	M	Bi		81° 44′		Ax. pl. ⊥b(010)	(G)
	$C_4H_7O_4N$	Acetamide oxalate	R	Bi	–		25°	Ax. pl. a(100); X∥c	(G)
697.1	$C_4H_8O_2Cl_2$	Dichlorobutylene glycol	Trig	Un					(G)
	$C_4H_8O_7NSb\ H_2O$	Ammonium antimonyl tartrate	R.	Bi.	–		130° 46′	Ax. pl c(001); X∥b	(G)
708	$C_4H_8O_3N_2\ H_2O$	Asparagine	R.	Bi.	+	l. 86° 40′ d. 87° 16′		Ax pl. b(010); Z∥c	(G)

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709	$C_4H_8O_4N_2$	Tartramide	R	Bi	−		43° (apprx.)	Ax. pl. b(010); X‖a	(G)
	$C_4H_9O_4N$	Ethylamine dioxalate	M	Bi	−		89° 20′	Ax. pl. b(010)	(G)
776	$C_4H_9O_5N$	Ammonium hydrogen malate	R	Bi	−	47° 54′	75° 24′	Ax. pl. b(010); X‖c	(G)
778	$C_4H_9O_6N$	Ammonium hydrogen tartrate	R	Bi	−	79° 54′		Ax. pl. c(001); X‖b	(G)
786	$C_4H_9N_3O_3$	Guanidine lactate	R	Bi	+	79° 12′		Ax. pl. a(100), Z‖b	(G)
788	$C_4H_{10}N_4S_2$	Ethylenediamine thiocyanate	M	Bi.	−	51°	89° 20′	Ax pl b(010), X∧c = 64° 30′ in obtuse ∠β	(G)
808	$C_4H_{10}O_4$	i-Erythrite	Tet	Un					(G)
	$C_4H_{12}NI$	Diethyl ammonium iodide	R	Bi	+		52° 15′ (apprx.)	Ax pl (001); Z‖a	(G)
	$C_4H_{12}O_5N_2$	Ammonium malate	R	Bi		47° 34′ (red)			(L-B)
835	$C_4H_{12}O_6N_2$	Ammonium tartrate	M	Bi.	−	39° 36	64° 46′	Ax pl b(010); X∧c = 18° 41′ in obtuse ∠β	(G)
835.1	$C_4H_{12}O_6N_2$	Ammonium racemate	M	Bi	+	60° 54		Ax pl. b(010)	(G)
	$C_5H_5O_4Cl$	Chlorocitraconic acid	R	Bi	+	46° 24′ (blue)	75° 5′ (blue)	Ax pl b(010), Z‖c	(G)
	$C_5H_4O_4N_2.H_2O$	Pyrazole dicarboxylic acid	M	Bi		77°		Ax pl. ⊥b(010); Z apprx ⊥a(403)	(G)
868	$C_5H_4O_4$	Aconic acid	R	Bi	−			Ax pl a(100); X‖b	(G)
877	$C_5H_5O_2N$	Pyrrole-2-carboxylic acid	M	Bi	+	62° 7′		Ax pl. b(010); Z∧c = 23° 45′ in obtuse ∠β	(G)
	$C_5H_8O_5N_2$	Urimidosuccinic acid	R	Bi	+	78° 14′		Ax pl. a(100); Z‖c	(G)
900	$C_5H_6O_4$	Itaconic acid	R	Bi	+		97° 40′ (red)	Ax pl. b(010); Z‖a	(G)
	$C_5H_7O_4Br$	Citrabromopyrotartaric acid	M	Bi		76°		Ax pl ⊥b(010), Z∧c = 62° in acute ∠β	(G)
	$C_5H_7O_4N_3$	Urimidosuccinic acid amide	M	Bi		79° 35′		Ax pl b(010)	(G)
947.1	$C_5H_6O_4$	Methyltetronic acid lactone	R	Bi	+		120° 10′		(14)
957	$C_5H_8O_6.H_2O$	Methyl hydrogen d-tartrate	R	Bi		60° (apprx.)		Ax pl a(100); Z‖c	(G)
	$C_5H_9O_2Br$	Bromohydrotiglic acid	M	Bi			150°		(G)
	$C_5H_9O_2N$	Hydroxypiperidone	M	Bi	+		92° 33′	Ax pl ⊥b(010); Z nearly ⊥a(100)	(G)
975.1	$C_5H_9O_3N$	α-Acetylaminopropionic acid	R	Bi	−	36° 9′		Ax pl a(100); X‖c	(G)
977	$C_5H_9O_4N$	*d*(*l*)-Glutaminic acid	R	Bi	−	40° 27′	66° 35′	Ax pl. b(010); X‖a	(G)
988.1	$C_5H_{10}O_4NCl$	*d*(*l*)-Glutamic acid hydrochloride	R	Bi	+	70° 44′		Ax pl. a(100); Z‖b	(G)
994.1	$C_5H_{10}O_2N_2$	Dimethylmalonamide	R	Bi	+		58° 27′	Ax. pl b(001); Z‖c	(G)
996	$C_5H_{10}O_4N_2$	Amylene nitrosate	M	Bi	+	62° 65′	103° 53′	Ax. pl ⊥b(010); Z∧c = 7° in obtuse ∠β	(G)
1035	$C_5H_{10}O_5$	*d*-Lyxose	M	Bi	−			Ax pl b(010)	(G)
1070.2	$C_5H_{11}O_4N$	Methyltetronamide	Not det	Bi	+		Large		(14)
	$C_5H_{12}NBr$	Piperidine hydrobromide	R	Bi			35° (apprx.)	Ax pl b(010); Z‖a	(G)
1075	$C_5H_{12}NCl$	Piperidine hydrochloride	R	Bi	−		52° 56′	Ax pl c(001); X‖a	(G)
1093	$C_5H_{12}O_4$	Pentaerythritol	Ditet	Un					(G)
	$C_5H_{12}NBr_2$	Trimethyl-bromoethylammonium bromide	M	Bi	+		40° 2′	Ax pl. ⊥(010); Z∧c = 39° 30′ in acute ∠β	(G)
	$C_6O_4N_2Br_4$	1, 2, 3, 5-Tetrabromodinitrobenzene	M	Bi	−		45° 54′	Ax pl b(010); X⊥r(201)	(G)
	C_6OCl_8	β-Octochlorocyclohexenone	R	Bi	+			Ax pl b(010); Z‖a	(G)
	C_6OCl_8	γ-Octochlorocyclohexenone	M	Bi	−	37° 38′	65° 59′	Ax pl. b(010); X∧c = about 93° in obtuse ∠β	(G)
1120	C_6HCl_5O	Pentachlorophenol (β-mod.).	M	Bi	+		65° 23.5′	Ax pl. ⊥b(010), Z∧c = 3° in acute ∠β	(G)
	$C_6H_2O_4N_2Br_2$	1, 3-Dinitro-4, 6-dibromobenzene (St mod.)	R	Bi	+		50° 52′	Ax. pl. a(100); Z‖c	(G)
	$C_6H_2O_4N_2Br_2$	1, 3-Dinitro-4, 6-dibromobenzene (metast mod.)	R	Bi	−		73° 5′	Ax pl. ⊥b(010); X ⊥a(100)	(G)
	$C_6H_2O_4N_2Br_2$	1, 2-Dinitro-4, 5-dibromobenzene	R	Bi	−	2H =	88° 22′	Ax pl. a(100); X‖c	(G)
	$C_6H_2O_2NBr_3$	2, 4, 6-Tribromonitrobenzene	M	Bi	−		90° 13′	Ax pl ⊥b(010)	(G)
1142	$C_6H_2O_4N_2I_2$	1, 3-Dinitro-2, 4-diiodo-benzene	R	Bi	+	63° 26′		Ax pl. a(100); Z‖c	(G)
1149	$C_6H_3O_4N_2Br$	3-Bromo-1, 2-dinitrobenzene	R	Bi	+	51° 30′ (red)		Ax. pl. b(010); Z‖c	(G)
1155	$C_6H_3O_2NBr_2$	3, 5-Dibromonitrobenzene	M	Bi	−		72° 19′	X∧c = 20° in obtuse ∠β	(G)
1155.1	$C_6H_3O_3NBr_2$	Nitrodibromophenol	M	Bi			70° 73°	Ax pl. ⊥b(010)	(G)
1163	$C_6H_3O_4N_2Cl$	4-Chloro-1, 2-dinitrobenzene	M		−		45° 31′	Ax pl. ⊥b(010)	(G)
1165	$C_6H_3O_4N_2Cl$	α-4-Chloro-1, 3-dinitrobenzene (St mod.)	R	Bi			102° 46′ (red)	Ax. pl. b(010), Z‖c	(G)
1165	$C_6H_3O_4N_2Cl$	α-4-Chloro-1, 3-dinitrobenzene (metast mod.)	R	Bi	+		94° 15′	Ax pl. a(100); Z‖b	(G)
1174.1	$C_6H_3O_3NCl_2$	4, 6-Dichloro-2-nitrophenol	M	Bi	−		62° 29′		(G)
	$C_6H_3O_3NI_2$	2, 6-Diiodo-4-nitrophenol	Tri	Bi			55° 30′		(G)
1200	$C_6H_3O_8N_5$	Tetranitroaniline	M or Tri	Bi.	−		120° (at least)		(37)
1216	$C_6H_4O_2NCl$	*m*-Chloronitrobenzene	R	Bi.	−		91° 23′	Ax. pl. a(100); X‖a	(G)
	$C_6H_4O_4NSCl$	*p*-Nitrobenzenesulfonyl chloride	M	Bi.	−		65° (apprx.)	Ax. pl. b(010); X∧c = 33° 30′ in obtuse ∠β	(G)
1243	$C_6H_4O_4S_2Cl_2$	*m*-Benzenedisulfonyl chloride.	M	Bi.	−		80° 35′	Ax. pl. b(010); X∧c = 85° in obtuse ∠β	(G)

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1274	$C_6H_4O_5N_2$	2, 3-Dinitrophenol	M.	Bi.			16°	Ax. pl. ⊥(010)	(29)
1277	$C_6H_4O_5N_2$	2, 6-Dinitrophenol	R.	Bi	+		95° 40′	Ax. pl. b(010); Z‖a	(G)
1278	$C_6H_4O_5N_2$	3, 4-Dinitrophenol	Tri.	Bi			65°		(29)
1377	C_6H_6NBr	*p*-Bromoaniline	R.	Bi	+		26° 57.5′	Ax pl. c(001); Z‖a	(G)
	$C_6H_6O_2NCl$	Nicotinic acid hydrochloride	R.	Bi	−		96° 22′	Ax. pl. a(100); X‖c	(G)
	$C_6H_6O_2NCl$	Picolinic acid hydrochloride	R	Bi	−	41° 16′	73° 52′	Ax. pl. b(010); X‖c	(G)
1384	$C_6H_6Cl_6$	*α-trans*-Benzenehexachloride	M	Bi	+		62° 2′	Ax. pl. b(010); Z∧c = 42° 25′ in obtuse ∠β	(G)
	$C_6H_6ON_2$	Picolinamide	M	Bi	+		73° 20′ (red)	Ax. pl. b(010)	(G)
	$C_6H_6O_2N_2$	2-Methylpyrazine-5-carboxylic acid	R	Bi			35° (apprx.)	Ax. pl. a(100); Z‖c	(G)
	$C_6H_6O_4N_2S$	*p*-Nitrobenzenesulfamide	M	Bi		59°		Ax. pl. b(010); Z∧c = 70° in acute ∠β	(G)
1412	$C_6H_6O_7N_4$	Ammonium picrate	R	Bi	−		56°		(37)
1414	$C_6H_6O_2$	*o*-Dihydroxybenzene	M	Bi	+		58° (apprx.)	Ax. pl. ⊥b(010); Z∧c = 6°-7°	(G)
1415	$C_6H_6O_2$	Resorcinol	R	Bi	−	46° 14′	76° 6′	Ax. pl. c(001); X‖a	(G)
1416	$C_6H_6O_2$	Hydroquinonol	Trig	Un					(G)
	$C_6H_6O_3\ 2H_2O$	Phloroglucinol	R	Bi	−		63° 49′	Ax pl c(001); X‖a	(G)
	$C_6H_6O_3$	*α*-Methyl-*β*-hydroxy-*γ*-pyrone (*β*-mod.)	R	Bi			Small	Ax pl (001); Bx_o = b-axis	(30)
1448	C_6H_7ON	*p*-Aminophenol	R	Bi	−		47° 37′	Ax pl c(001), X‖a	(G)
	$C_6H_7O_3NS$	Phenylsulfohydroxamic acid	R	Bi	+		43° 29′	Ax pl. c(001); Z‖a	(G)
	C_6H_8NBr	Aniline hydrobromide	R	Bi	−		35°	Ax. pl a(100)	(G)
	$C_6H_8O_2Br_4$	Tetrabromocaproic acid	M	Bi.	+		21° 52′	Ax pl. ⊥b(010); Z∧c = 100° in obtuse ∠β	(G)
	$C_6H_8O_2N_2Cl_2$	1, 4-Dichloro-1, 4-dinitrosocyclohexane	M	Bi.	+	61° 58′ (blue)	100° 15′ (white)	Ax pl b(010); Z∧c = 40° 30′ in acute ∠β	(G)
	$C_6H_8O_4NCl_3\ 2H_2O$	Ammonium trichlorodihydroxycyclopentane carboxylate	R	Bi			81° (apprx.)	Ax pl. (100)	(4)
	$C_6H_8N_2$	2, 6-Dimethylpyrazine	M	Bi			86° (apprx.)	Ax. pl. b(010); Z∧c = 20° in obtuse ∠β	(G)
1507	$C_6H_8O_7\ H_2O$	Citric acid	R	Bi	+	65° 42′	108° 40′	Ax pl a(100), Z‖a	(G)
1523	$C_6H_9O_3NS$	Ammonium benzenesulfonate	R	Bi	+		33° 36′	Ax pl a(100); Z‖c	(G)
	$C_6H_9O_3N$	Trimorpholine	M	Bi	+	80°		Ax pl b(010)	(G)
	$C_6H_9O_9N$	Acetamide dioxalate	Tri	Bi	−		69° 20′		(G)
	$C_6H_{10}O_4Br_2$	Inosite dibromhydrin	R	Bi	+	67° 30′		Ax. pl b(010); Z‖a	(G)
	$C_6H_{10}ClNO_3$	Trimorpholine hydrochloride	M	Bi			50° 60′	Ax. pl ⊥b(010) (red)	(G)
1562	$C_6H_{10}O_4$	Adipic acid	M	Bi	−		47° 30′	Ax pl b(010)	(G)
1563	$C_6H_{10}O_4$	1, 1-Dimethylsuccinic acid	M	Bi		16° 12′	41° 28′	Bx_a nearly ⊥(001), Ax pl (010)	(28)
	$C_6H_{10}O_5$	1-Glycosan (1-Glucose anhydride)	R	Bi			71° 45′	Ax pl a(100); X‖c	(G)
	$C_6H_{10}O_5$	*dl*-Dilactylic acid	R	Bi			65°	Ax pl ‖(010), Bx_a ⊥(001)	(17)
	$C_6H_{10}O_5$	Dilactylic acid	R	Bi	−		65° (apprx.)	Ax pl b(010); X‖c	(G)
	$C_6H_{10}O_5$	Isosaccharine	M.	Bi.	+		25° 19′	Ax. pl. ⊥b(010), Z∧c = 63° 15′ in obtuse ∠β	(G)
	$C_6H_{11}O_7N$	Acetamide ditartrate	M	Bi	−		70° 30′	Ax pl b(010), X∧c = 36° in acute ∠β	(G)
	$C_6H_{11}O_2N_3$	Pyrrolidine-α, α-dicarboxylic acid diamide	R	Bi	+		63° 30′ (apprx.)	Ax pl. b(010), Z‖c	(G)
	$C_6H_{12}O_7N_2S_2\ H_2O$	Ammonium phenol-2, 4(?)-disulfonate.	M	Bi	+		113° 45′	Ax. pl b(010); Z∧c = 25° 21′ in obtuse ∠β	(G)
	$C_6H_{12}O_2$	*cis-o*-Dihydroxyhexahydrobenzene	R.	Bi	+		53° 10′	Ax pl b(010); Z‖c	(G)
	$C_6H_{12}O_5$	*α*-Methylxyloside	M.	Bi.	−	35° 14′	54° 55′	Ax pl b(010); X∧c = 30° in acute ∠β	(G)
1670	$C_6H_{12}O_5$	*d*-Quercitol	M.	Bi.	+		58° 1′	Ax pl b(010); Z∧c = 11° 46′ in acute ∠β	(G)
1672	$C_6H_{12}O_5\ H_2O$	*β*-Rhamnose	M	Bi	−	58° 5′		Ax pl b(010)	(G)
	$C_6H_{12}O_6\ 2H_2O$	*d*(*l*)-Inosite	R	Bi	+		42° 30′	Ax. pl a(100); Z‖c	(G)
	$C_6H_{12}O_6\ 2H_2O$	Dambose ("meso"-inosite)	M	Bi	+		47° 20′	Ax. pl ⊥b(010); Z∧c = 17° in obtuse ∠β	(G)
	$C_6H_{13}O_5N\ H_2O$	Ammonium hydrogen ethoxysuccinate	R	Bi			20° (apprx.)	Ax pl c(001); Z‖b	(G)
	$C_6H_{12}ON_2$	2-Propylantipyrine	M	Bi		52° 50′			(L-B)
	$C_6H_{14}O_4S_2N_2Cl_2$	Cystine hydrochloride	M	Bi	+		3° 16′	Ax pl ⊥b(010); Z ⊥a(10$\bar{1}$)	(G)
1750	$C_6H_{14}O_6$	Dulcitol	M.	Bi	−		151° 10′ (red)	Ax. pl ⊥b(010); X‖b	(G)
1751	$C_6H_{14}O_6$	*d*-Mannitol (*α*-mod.)	R.	Bi	−		100° (apprx.)	Ax pl c(001); X‖b	(G)
1751	$C_6H_{14}O_6$	*d*-Mannitol (*β*-mod.)	R	Bi	−		71° 30′	Ax pl a(100); X‖b	(G)
1752.1	$C_6H_{14}O_6\ \frac{1}{2}H_2O$	Sorbitol	M.	Bi.	−		100° (apprx.)	Ax pl b(010); Z nearly ⊥c(001)	(G)
1760 1	$C_6H_{15}PS$	Triethylphosphine sulfide	H.	Un	+				(G)
	$C_6H_{16}N_2Br_2\ H_2O$	*β*-2, 5-Dimethylpiperazine hydrobromide	R	Bi.	+		72° (apprx.)	Ax. pl. a(100); Z‖c	(G)
	$C_6H_{16}NI$	Dimethyl diethyl ammonium iodide	R	Bi.			82°	Z‖c	(G)
	$C_7H_3O_3Cl_5$	1-Methyl-1, 3, 3, 5, 5-pentachlorocyclohexan-2, 4, 6-trione	R	Bi	+		15° (apprx.)	Ax pl a(100), Z‖c	(G)

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1789	$C_7H_3O_8N_3$	2, 4, 6-Trinitrobenzoic acid	R	Bi	+		84° 36′	Ax. pl. c(001), Z‖b	(G)
	$C_7H_4O_3Cl_2$	3, 5-Dichlorosalicylic acid	R	Bi	+		29° 15′	Ax pl b(010); Z‖c	(G)
1835	$C_7H_4O_6N_2$	2, 4-Dinitrobenzoic acid	M	Bi	–		18°	Ax. pl (010); Bxa nearly ⊥(101)	(11)
1837	$C_7H_4O_6N_2$	2, 6-Dinitrobenzoic acid	R	Bi	+		103°	Ax pl. (100), Bxa ⊥(010)	(11)
1839	$C_7H_4O_6N_2$	3, 5-Dinitrobenzoic acid	M	Bi	–		80° 16′	Ax. pl. b(010); X∧c = 48° in acute ∠β	(G)
	$C_7H_4O_6$	Chelidonic acid.....	M	Bi	–		40° (apprx.)	Ax. pl ⊥b(010); X nearly ‖r(101)	(G)
1843	$C_7H_4O_7 \cdot 3H_2O$	Meconic acid . . .	R	Bi	–		48° 55′	Ax pl b(010); X‖c	(G)
1881	$C_7H_5O_2I$	o-Iodobenzoic acid	M	Bi			70° (apprx)	Ax. pl. ⊥b(010); Bxa ‖c-axis	(G)
1903	$C_7H_5O_4N \cdot 2H_2O$	Dipicolinic acid .	R	Bi			99°	Ax pl (001); Bx ⊥(010)	(33)
1909	$C_7H_5O_5N$	5-Nitro-2-hydroxybenzoic acid	M	Bi	+		105° 38′		(G)
1977	$C_7H_6N_2$	Benzimidazol . .	R	Bi	+	86° 45′		Ax pl c(001); Z‖b	(G)
1979	$C_7H_6N_2$	Indazole . . .	M	Bi		50° (apprx)		Ax pl b(010); Z∧c = 18° in obtuse ∠β	(G)
1985	$C_7H_6O_4N_2$	2, 4-Dinitrotoluene .	M	Bi				Ax pl ⊥b(010); X∧c = 32° in acute ∠β	(G)
1987	$C_7H_6O_4N_2$	2, 6-Dinitrotoluene	R	Bi.	–			Ax pl a(100); X‖c	(G)
1989	$C_7H_6O_4N_2$	3, 5-Dinitrotoluene	M	Bi	–		98° 4′	Ax pl ⊥b(010)	(G)
	$C_7H_6ON_4 \cdot H_2O$	c-Phenylhydroxytetrazole	R	Bi		60° 70°		Ax pl a(100); Z‖c	(G)
2074	$C_7H_7O_2N$	Anthranilic acid	R	Bi			78° 30′ (Hg. yellow)	Ax pl c(001); Z‖a; Bxa ⊥(100)	(G)
	$C_7H_7O_2N$	Benzohydroxamic acid	R	Bi	+		50° 2′	Ax pl a(100); Z‖b	(G)
	$C_7H_7O_2N \cdot H_2O$	Pyridinebetaine	M	Bi	–	25° 16′		Ax. pl b(010); X∧c = 12° 45′ in obtuse ∠β	(G)
	$C_7H_7O_4N_3$	3, 5-Dinitro-p-toluidine .	R	Bi					(3)
	C_7H_8ONCl	Isobenzaldoxime hydrochloride	R	Bi			100° (apprx)	Ax pl a(100); Z‖b	(G)
	$C_7H_8O_2NCl$	Pyridinebetaine hydrochloride	M	Bi	+	52° 3′	88° 8′	Ax pl ⊥b(010); Z∧c = 9° 27′ in acute ∠β	(G)
	$C_7H_9O_2N_3 \cdot H_2O$	Benzenylamidine nitrite	M (?)	Bi	–		78° 55′	Ax pl ‖d(010)	(G)
2174	$C_7H_8O_2$	Guaiacol	Trig	Un					(G)
2185	$C_7H_8O_4$	Hydrochelidonic anhydride	R	Bi	–		120° (apprx)	Ax. pl c(001); X‖a	(G)
	$C_7H_9O_5Br$	Bromo-shikimilactone	H	Un					(G)
	$C_7H_9N_2Cl \cdot 2H_2O$	Benzenylamidine hydrochloride	R	Bi			35° (apprx)	Ax pl a(100); Z‖c	(G)
	$C_7H_9O_2Cl \cdot 2H_2O$	α, α-Dimethyl-γ-pyrone hydrochloride	R	Bi	–		90° (apprx)	Ax pl a(100); X‖b	(G)
	C_7H_9ON	3-Amino-p-cresol	R	Bi	+		44° 46′	Ax pl a(100); Z‖c	(G)
	$C_7H_9ON \cdot 3H_2O$	2, 6-Dimethyl-4-hydroxypyridine	M	Bi			110° 41′	Ax. pl. b(010)	(G)
2225	$C_7H_9O_2N$	Ammonium benzoate	R	Bi	+		67°	Ax pl a(100); Z‖c	(G)
2233	$C_7H_9O_3NS$	p-Toluidine-2-sulfonic acid	M	Bi.	+		87° 54′	Ax pl b(010); Z∧c = 8° in obtuse ∠β	(G)
2234.1	$C_7H_9O_5NS$	Ammonium o-sulfobenzoate	R	Bi	–	53° 29′	84° 30′	Ax pl b(010); X‖a	(G)
	$C_7H_{10}NBr$	Toluidine hydrobromide	R	Bi	–	82° 37′		Ax pl c(001); X‖b	(G)
	$C_7H_{10}O_4Br_2$	Dibromotrihydroxy tetrahydrobenzoic acid	R	Bi	+	76° 32′		Ax. pl c(001)	(G)
2260.1	$C_7H_{10}O_7N_2$	Mono-ureidodihydroxy dimethyl succinate	R	Bi		72° 15.5′		Ax. pl. b(010); Z‖c	(G)
2260.2	$C_7H_{10}O_5N_4$	Isohydroxydimethylurea	M	Bi	+	40° 9.5′	62° 34.25′	Ax. pl. ⊥b(010); Z∧c = 2° 15′ in acute ∠β	(G)
	$C_7H_{12}O_4N_2S \cdot 2H_2O$	2, 4-Toluylendiamine sulfate.	M	Bi			100° (apprx)		(G)
	$C_7H_{12}O_4$	Trimethyl succinic acid	R	Bi		84° 11′		Ax pl (100); Bxa ⊥(001)	(28)
	$C_7H_{14}O_5$	l-Methylrhamnoside	R	Bi	–	36° 11′	57° 8′	Ax pl b(010), X‖c	(G)
	$C_7H_{14}O_6$	α-Methyl mannoside	R	Bi	+	46° 58′	75°	Ax pl b(010), Z‖a	(G)
2372	$C_7H_{14}O_6$	α-Methyl glucoside	R	Bi	+	85° 18′		Ax. pl. b(010); Z‖c	(G)
2373	$C_7H_{14}O_6$	β-Methyl glucoside	Tet	Un					(G)
	$C_7H_{14}O_6 \cdot H_2O$	dl-α-Methyl galactoside	R	Bi	+	53° 5′	85° 45′	Ax pl a(100); Z‖c	(G)
	$C_8H_4O_5N_3Cl_3$	2, 4, 6-Trichloro-3-nitrobenzoic acid methyl nitramide	M	Bi	–		42° (apprx)	Ax. pl ⊥b(010); X∧c = 69° in acute ∠β	(G)
	$C_8H_5O_3N$	Isatoic acid anhydride	M	Bi			90° (apprx)	Ax. pl. ⊥b(010)	(G)
	$C_8H_5O_3N$	Phthaloxime	M	Bi					(26)
2452	C_8H_6NBr	Bromobenzyl cyanide	Trig	Un					(L-B)
	$C_8H_6O_3N_2Br$	1-Nitro-3-bromo-4-acetanilide (St mod)	M	Bi	–		124° 10′	Ax. pl. ⊥b(010)	(G)
	$C_8H_6O_3Cl_4$	Tetrachlorophloroglucinol dimethyl ether	R	Bi	+		90° (apprx)	Ax. pl. a(100)	(G)
	$C_8H_7O_3N_2Br$	Nitrobromoacetanilide (α-mod)	M	Bi.	–		124° 10′	Ax. pl. ⊥(010); Bxa nearly ⊥(001)	(2)
	$C_8H_7ONCl_2$	Dichloroacetanilide	M	Bi.	+	83° 35′		Ax pl ⊥b(010); Z∧c = 61° in obtuse ∠β	(G)
2536	$C_8H_7O_6N_3$	2, 3, 6-Trinitro-p-xylene	M.	Bi.	–	64° 32′		Ax pl b(010), X∧c = 28° in obtuse ∠β	(G)

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	C_8H_8ONCl	Methylphenylurea chloride	R	Bi.			27° 41′	Ax. pl c(001); Z‖b	(G)
	$C_8H_8ON_4$	Methoxyphenyltetrazole	Tri	Bi	−	74° 48′		Ax. pl. ⊥b-axis	(G)
2556	$C_8H_8O_3N_2$	m-Nitroacetanilide	M	Bi			80° (apprx.)	Ax. pl. ⊥b(010)	(G)
2564	$C_8H_8O_4N_2$	2, 3-Dinitro-p-xylene	M	Bi	+		105° 8′	Ax. pl. ⊥b(010)	(G)
	$C_8H_8O_3N_4$	9-Allyluric acid		Un					(21)
	$C_8H_8O_6$	Hematinic acid anhydride	R	Bi	+		53° (apprx)	Ax. pl. b(010); Z‖a	(G)
	$C_8H_8O_7$	Acetylcitric anhydride	R	Bi	−	71° 2′	120° 10′	Ax. pl. a(100); X‖c	(G)
	$C_8H_9N_4Cl\ H_2O$	Phenyliminotriazoline hydrochloride	M	Bi	+			Ax. pl ⊥b(010), Z∧c = 44° in acute ∠β	(G)
	$C_8H_9O_2SCl$	Chloromethyl p-tolyl sulfone	R	Bi	+		110° (apprx)	Ax. pl. b(010); Z‖c	(G)
2649	C_8H_9ON	Acetanilide	R	Bi	+	88° 36′		Ax. pl b(010); Z‖c	(G)
2657	$C_8H_9O_2N$	p-Acetaminophenol	M	Bi	−		90°	Ax. pl. ⊥b(010); X‖b	(G)
2681	$C_8H_9O_4N$	Biliverdic acid	M	Bi			31° (apprx)	Ax. pl ⊥b(010); X∧c = 55° in obtuse ∠β	(G)
	$C_8H_9O_4N_3$	2, 4-Dinitrodimethylaniline	R	Bi	−		23° 30′	Ax. pl c(001); X‖a	(G)
	$C_8H_{10}O_2NCl$	Phenylglycocoll hydrochloride	R	Bi	−	18° 9′		Ax. pl b(010); X‖a	(G)
	$C_8H_{10}O_2$	p-Hydroxyphenylethyl alcohol (Tyrosol)	R	Bi			84° 30′		(8)
	$C_8H_{10}O_3$	Dimethylpyrogallol	M.	Bi			53° 47′	Ax pl ⊥b(010)	(G)
	$C_8H_{12}NBr$	Xylidine hydrobromide	R	Bi			55° 19′	Ax. pl b(010); X‖a	(G)
	$C_8H_{12}O_2NBr$	Tetramethylsuccinic bromoimide,	R	Bi	−		62° 15′ (Hg, yellow)	Ax. pl (100); Bxa ⊥(001)	(28)
	$C_8H_{12}O_2NCl$	Tetramethylsuccinic chloroimide	R	Bi	−		47° 29′ (Hg, yellow)	Ax. pl (010), Bxa ⊥(001)	(28)
	$C_8H_{12}O_2NCl$	Vanillylamine hydrochloride	M	Bi	−		70°		(23)
	$C_8H_{12}NI$	Ethylaniline hydroiodide	R	Bi	−		65° (apprx)	Ax. pl. a(100); X‖c	(G)
2808 1	$C_8H_{12}O_4N_2$	Tetraacetylhydrazine	R	Bi	+	17° 5′	79° 33′	Ax. pl c(001); Z‖b	(G)
	$C_8H_{12}O_4$	trans-Hexahydroterephthalic acid	M	Bi			65° (apprx)	Ax. pl ⊥b(010)	(G)
	$C_8H_{12}O_4$	Norpinic acid	M	Bi	+		7° (apprx)	Ax pl. ⊥b(010)	(G)
	$C_8H_{12}O_4$	Isopropylisoparaconic acid	M	Bi	+		51° 12′	Ax pl. ⊥b(010), Z∧c = 83° in obtuse ∠β	(G)
	$C_8H_{14}O_6N_2$	Lysidine d-ditartrate	M	Bi	−	80° 1′		Ax. pl b(010); X∧c = 30° in obtuse ∠β	(G)
	$C_8H_{16}O_{14}N_2Sb_2\ H_2O$	Ammonium antimonyl tartrate	R	Bi		68° 8′			(L-B)
2915	$C_8H_{16}O_4$	Metaldehyde	Tet	Un					(G)
2916 1	$C_8H_{16}O_4$	bis-Methoxyacetol	M	Bi				Ax. pl ⊥b(010)	(G)
2920	$C_8H_{16}O_6$	d, α-Ethyl glucoside	R	Bi	−	51° 14′		Ax pl b(010), X‖a	(G)
	$C_8H_{17}N_2Cl$	4, 4-Dimethyl-5-isopropylpyrazoline hydrochloride	M	Bi	−	56°	94° 40′	Ax pl b(010); X∧c = 21° in obtuse ∠β	(G)
	$C_8H_{17}N_2Cl$	Isobutyraldazine hydrochloride	M	Bi	−	56°	94° 41′	Ax pl b(010); X∧c = 21° in obtuse ∠β	(G)
2945	$C_8H_{18}NBr$	d-Coniine hydrobromide	R	Bi	+		45° 50′	Z‖c	(G)
2946	$C_8H_{18}NCl$	d-Coniine hydrochloride	R	Bi	+		20° 0′	Ax pl c(001); Z‖b	(G)
2948	$C_8H_{18}NI$	d-Coniine hydroiodide	M	Bi	−		107° 30′ (apprx)	Ax pl b(010)	(G)
	$C_8H_{20}PI$	Tetraethyl phosphonium iodide	Trig	Un					(G)
	$C_9H_6OBr_2$	Dibromohydrindone	R	Bi	−		36° 29′	Ax pl b(010), X‖a	(G)
	C_9H_7OBr	Phenyl-α-bromoacrolein	R	Bi	+		39°	Ax pl b(010); Z‖c	(G)
	C_9H_7OCl	Phenyl-α-chloroacrolein	R	Bi	+		22°	Ax pl. a(100); Z‖c	(G)
	$C_9H_8O_2Br_2$	Phenyldibromopropionic acid	M	Bi	+		57° (apprx)	Ax pl ⊥b(010)	(G)
	$C_9H_8O_3Cl_2$	Ethyl dichlorosalicylate	R	Bi.	−			Ax pl. b(010); X‖c	(G)
3060	$C_9H_8N_2$	3-Aminoquinoline	R	Bi.	−		45°	Ax pl. c(001); X‖b	(G)
	$C_9H_8O_4$	Acetylsalicylic acid	Tri	Bi.	−	Small		Sections ⊥Bxa; elongation = Z	(42)
	$C_9H_8O_{12}N_4$	Pentaerythritol nitrate	Tet	Un.					(19)
	$C_9H_9O_4N_2Br$	Bromodinitromesitylene	M	Bi	−	42° 19′	88° 13′	Ax. pl. ⊥b(010); X‖b	(G)
	$C_9H_9Br_3$	Tribromomesitylene	Tri	Bi.			24° 3′		(G)
	$C_9H_9O_3Cl_3$	1, 3, 5-Trimethyl-1, 3, 5-trichlorocyclohexan-2, 4, 6-trione	M	Bi.	−		60° (apprx)	Ax. pl. b(010)	(G)
3103	C_9H_9ON	Hydrocarbostyril	R	Bi.	−	60° (apprx)		Ax pl a(100); X‖c	(G)
	$C_9H_9O_3N$	Benzoylacetohydroxamic acid	M.	Bi.	−	47° 10′		Ax. pl. ⊥b(010); X∧c = 66° in acute ∠β	(G)
3111	$C_9H_9O_3N$	Hippuric acid	R	Bi.	+	65° 49′		Ax pl c(001)	(G)
	$C_9H_9ON_2$	1-Phenyl-3-methylpyrrodiazolone	R.	Bi.	−		64° (red)	Ax. pl b(010); X‖c	(G)
	$C_9H_{10}ON_2$	Isonitrosoanilacetone	R.	Bi.	−		41° 40′	Ax. pl a(100); X‖c	(G)
	$C_9H_{10}O_4N_2$	Dinitromesitylene	R.	Bi.	−		50° (apprx.)	Ax. pl. a(100); X‖c	(G)
	C_9H[illegible]O	Dihydrodiacetyllevulinic acid hes	M.	Bi.	+	74° 45′		Ax. pl b(010); Z∧c = 5° in obtuse ∠β	(G)

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3177	$C_9H_{10}O_4$	*d*(*l*)-Phenylglycerie acid	M.	Bi	+		19°	Ax. pl b(010); Z ∧ c = 47° in acute ∠β	(G)
3178	$C_9H_{10}O_4$	*dl*-Phenylglyceric acid	M.	Bi.			19°	Ax. pl (010)	(10)
3179	$C_9H_{10}O_4$	*d*(*l*)-*p*-Methoxymandelic acid	M.	Bi			76° 30′ (apprx)	Ax. pl. b(010)	(G)
	$C_9H_{11}O_3Br_3$	Tribromocineolic anhydride	R.	Bi.	+		75° (apprx)	Ax. pl a(100); Z∥c	(G)
	$C_9H_{11}O_4Cl$	β-Anhydrocamphoronyl chloride	R.	Bi	+		75° (apprx)	Ax pl c(001), Z∥c	(G)
3194	$C_9H_{11}ON$	*o*-Acetotoluide	R	Bi		58° 28′		Ax pl b(010), Z∥a	(G)
3196	$C_9H_{11}ON$	*p*-Acetotoluide	M	Bi	+	88° 30′		Ax pl b(010)	(G)
3199	$C_9H_{11}ON$	*N*-Methylacetanilide	R	Bi	+	51° 11′	87° 8′	Ax pl b(010); Z∥c	(G)
	$C_9H_{11}O_2N$	Methyl *p*-toluohydroxamic acid	M	Bi				Ax pl ⊥b(010); X∥b	(G)
	$C_9H_{11}O_2N$	Phenyl-β-aminopropionic acid	M	Bi	+		77° 37′	Ax pl ⊥b(010), Z ∧ c = 54° in obtuse ∠β	(G)
3220	$C_9H_{11}O_2N$	Nitromesitylene	R	Bi			65° 32′	Ax pl a(100), X∥c	(G)
	$C_9H_{11}O_2N_3$	ω′-Methyl-ω-phenyl biuret	H	Un					(5.8)
	$C_9H_{11}O_3NS.H_2O$	Tetrahydroquinoline-5-(ana)-sulfonic acid (St mod)	R	Bi.			110° 39′ (apprx)	Ax pl b(010); Z∥a	(G)
	$C_9H_{12}ON_2$	Benzenylaminooxime ethyl ether	R.	Bi		83° 21′		Ax pl c(001); Z∥a	(G)
	$C_9H_{12}O_2N_2.H_2O$	Benzenylamidine acetate	M	Bi	-		53° 59′	Ax pl b(010), X ∧ c = 15° in obtuse ∠β	(G)
3232	$C_9H_{12}O_3N_4$	1, 3, 7, 9-Tetramethyluric acid	M.	Bi	+	75° 19′		Ax pl ⊥b(010); Z ∧ c = 9° 30′ in acute ∠β	(G)
	$C_9H_{12}O_2S$	Ethyl-*p*-tolyl sulfone	R	Bi		84°		Z∥c	(G)
	$C_9H_{12}O_2S$	*n*-Propylphenyl sulfone	M	Bi	+		30° 10′	Ax pl b(010); Z ∧ c = 9° in obtuse ∠β	(G)
	$C_9H_{12}O_3.3H_2O$	Trimethylphloroglucinol	M	Bi			80° (apprx)	Ax pl b(010); X ⊥c(001)	(G)
3251	$C_9H_{12}O_3$	Pyrogallol trimethyl ether	R	Bi			80° (apprx)	Ax pl b(010), Z∥c	(G)
	$C_9H_{12}O_4$	Anhydrocamphoronic acid	R	Bi.	+		76° (apprx)	Ax pl. b(010); Z∥c	(G)
	$C_9H_{12}O_8$	Methanetetraacetic acid	Tet	Un					(19)
	$C_9H_{13}NBrCl$	*m*-Chlorophenyltrimethyl ammonium bromide	R	Bi	-		3° 35′	Ax pl. a(100); X∥c	(G)
	$C_9H_{13}NCl_2$	*m*-Chlorophenyltrimethyl ammonium chloride	R	Bi			24° 59′	Ax pl. b(010); X∥c	(G)
	$C_9H_{13}O_4NS$	Tetrahydroquinoline sulfate	M	Bi			71° 2′		(G)
	$C_9H_{13}O_2N_3$	Nitrodiaminomesitylene	M	Bi.	+		40° (apprx)	Ax pl. b(010)	(G)
	$C_9H_{13}O_5N_3$	*m*-Nitrophenyltrimethyl ammonium nitrate	R	Bi			43° 7′	Ax pl c(100); Z∥c	(G)
	$C_9H_{13}O_7NS$	Tyrosine sulfate	M	Bi.			86°	Ax pl b(010)	(G)
	$C_9H_{14}O_2NCl$	Veratryl amine hydrochloride	M	Bi	−		About 60°		(22)
	$C_9H_{14}O_7N_2$	Mono-uriendihydroxy diethyl succinate	R	Bi		84° 1 5′		Ax pl b(010); Z∥c	(G)
	$C_9H_{14}O_7$	β-Oxycamphoronic acid (?)	M	Bi	+	80° 17′		Ax pl b(010); Z ∧ c = 41° 45′ in obtuse ∠β	(G)
	$C_9H_{15}ON$	N-Methylgranatonine	R	Bi	+		78° 40′	Ax pl b(010); Z∥c	(G)
3293 1	$C_9H_{15}O_3N.H_2O$	l-Ecgonine	M	Bi.			70° (apprx)	Ax pl ⊥b(010)	(G)
	$C_9H_{15}O_4N$	α-Aminoethylidene diethyl succinate	R	Bi			83° 53′	Ax pl b(010), Z∥a	(G)
	$C_9H_{16}O_2N_3SCl.2H_2O$	Ergothioneine hydrochloride	R	Bi.	-		79°	Ax pl c(001), X∥b	(G)
	$C_9H_{16}O_2N_3SI.2H_2O$	Ergothioneine hydroiodide	R	Bi.	+		70° (apprx)	Ax pl b(010); Z∥a	(G)
	$C_9H_{16}O_2$	3, 3, 5-Trimethylhexan-ol-olid	R	Bi	−	57° 16′	93° 14′	Ax pl c(001); X∥a	(G)
	$C_9H_{17}O_2N_3$	*N*-Methylpyrrolidine-α, α-dicarboxy methylamide	M	Bi	-		110° (apprx)	Ax pl b(010)	(G)
3344	$C_9H_{16}O_7$	Galactite	R	Bi.	−	69° 46′		Ax pl b(010); X∥a	(G)
	$C_{10}H_4OCl_6$	Hexachloro-α-ketohydronaphthalene	M	Bi	−	74° 11′		Ax pl ⊥b(010); X ∧ c = 108° (?) in obtuse ∠β	(G)
	$C_{10}H_4OCl_6$	Hexachloro-β-ketohydronaphthalene	R	Bi	+	91° 6′ (at axis c)		Ax pl. a(100), Z∥b	(G)
	$C_{10}H_5OCl_3$	Trichloro-α-ketonaphthalene	M	Bi	-		113° 20′	Ax pl ⊥b(010); X ∧ c = 66° in acute ∠β	(G)
	$C_{10}H_5OCl_3$	α-Trichloro-β-ketonaphthalene	R	Bi		57° 6′	93° 34′	Ax pl a(100); Z∥c	(G)
	$C_{10}H_5OCl_5$	α-Pentachloro-β-ketohydronaphthalene	M	Bi	−			Ax pl ⊥b(010); X ∧ c = 17° 57′ (?) in acute ∠β	(G)
3404	$C_{10}H_5O_6N_3$	1, 3, 5-Trinitronaphthalene	R	Bi	−		94° 14′	Ax pl c(001); X∥a	(G)
3495	$C_{10}H_8Cl_4$	Naphthalene tetrachloride	M	Bi			84° (apprx)	Ax. pl. ⊥b(010)	(G)
	$C_{10}H_8O_3N_2$	Diisonitrosoisosafrol anhydride	R	Bi	−		62° 14′	Ax pl c(001); X∥b	(G)
	$C_{10}H_8O_3$	Pinastrinic acid	R.	Bi	+			Ax. pl. a(100); Z∥c	(G)
3539	$C_{10}H_8O_6S_2.4H_2O$	Naphthalene-1, 5-disulfonic acid	M	Bi	−	55° 34′ (calc)		Ax pl. ⊥(010), n_α ∧ c = 84° 0.5′ in acute ∠β	(41)
3540	$C_{10}H_8O_6S_2.4H_2O$	Naphthalene-1, 6-disulfonic acid	M.	Bi.		79° 0.5′		Ax pl. ⊥(010); n_β ∧ c = 72°-76° in acute ∠β	(41)
	$C_{10}H_9O_2Br$	Phenylisobromo butyro lactone .	M.	Bi			57° 12′	Ax. pl. ⊥b(010); Z ∧ c = 8° 45′ in obtuse ∠β	(G)

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	$C_{10}H_9O_3N$	Phthalylethylhydroxylamine	R	Bi.	−		91° 17′	Ax. pl. a(100); X∥c	(G)
	$C_{10}H_9O_3N$	Phthaloxime ethyl ether	R.	Bi.			70° (apprx.)	Bx_a ⊥(001)	(26)
	$C_{10}H_9O_6N$	Dimethylnitroterephthalate	Tri.	Bi.	−		95° 30′	X ⊥b(010)	(G)
	$C_{10}H_9O_6N_3$	Nitrodiisonitrosoanethol peroxide	M.	Bi.		73° 48′		Ax. pl. b(010); Z∧c = 38° in acute ∠β	(G)
3585	$C_{10}H_{10}ON_2$	N-Phenyl-3-methylpyrazolone	M	Bi			72° 56′	Ax. pl. ⊥b(010); Z∥b	(G)
	$C_{10}H_{10}O_3N_2$	Diisonitrosoanethol anhydride	M.	Bi				Ax. pl. ⊥b(010); Z∧c = 40° in acute ∠β	(G)
	$C_{10}H_{10}O_3$	Phenylisooxybutyrolactone	M	Bi				Ax. pl b(010); Z∧c = 96° in obtuse ∠β	(G)
	$C_{10}H_{10}O_4$	2, 4-Dihydroxycinnamic acid	M.	Bi.	−		106° 20′ (red)	Ax pl. ⊥b(010)	(G)
	$C_{10}H_{11}O_4N_2Cl$	Dinitrochlorocymene	?	Bi.	+		120°		(37)
	$C_{10}H_{11}O_4N_2Cl$	2-Chloro-5, 6-dinitrocymene	M.?	Bi.	−		70°		(37)
	$C_{10}H_{11}ON$	*β*-*β*-Dimethyl-*α*-indolinone	R.	Bi	-	46° 39′	81° 48′	Ax pl. c(001); X∥a	(G)
	$C_{10}H_{11}ON$	*β*-Ethyl-*α*-indolinone	M.	Bi.	−		38° (apprx.)	Ax. pl. ⊥b(010)	(G)
	$C_{10}H_{11}O_4N$	Nitrocumic acid	M.	Bi.	−	36° 58′	64° 25′	Ax. pl. b(010); X∧c = 14° 11′ in acute ∠β	(G)
	$C_{10}H_{12}O_3N_2$	*p*-Aminophenaceturic acid	M.	Bi	−		102° 30′	Ax pl. ⊥b(010); X nearly ∥c	(G)
	$C_{10}H_{12}O_3N_2$	*α*-Diisonitrosoanethol	M.	Bi	+		30° 45′	Ax. pl. ⊥b(010)	(G)
	$C_{10}H_{12}O_3N_2$	Ethyl Nω-phenyl allophanate		Bi					(26)
	$C_{10}H_{12}O_3$	*p*-Methoxyhydroatropic acid	M.	Bi	+	77° 58′		Ax pl b(010), Z∧c = 57° in acute ∠β	(G)
	$C_{10}H_{12}O_4$	Cantharidin	R.	Bi.		89° 7′		Ax. pl c(001); Z∥b	(G)
	$C_{10}H_{12}O_4S$	*α*-Phenylsulfonebutyric acid	R.	Bi	-	46° 45′		Ax pl. b(010); X∥a	(G)
	$C_{10}H_{12}O_5$	Methyl 4-hydroxy-3, 5-dimethoxybenzoate	M	Bi			63° (apprx.)	Ax pl. b(010); X ⊥r(101)	(G)
	$C_{10}H_{13}Br_3$	Tribromocamphene	R	Bi	−	80° (apprx.)		Ax. pl. c(001); X∥b	(G)
3700	$C_{10}H_{13}ON$	*N*-Ethylacetanilide	R	Bi.	+		103° 27′	Ax. pl. b(010); Z∥c	(G)
3716	$C_{10}H_{13}O_2N$	Phenacetin	M	Bi		62° 14′		Ax pl b(010)	(G)
	$C_{10}H_{13}O_2N$	*p*-Tolyl urethane	M.	Bi	−		59° 46′	Ax pl b(010); X∧c = 27° in acute ∠β	(G)
	$C_{10}H_{13}O_3N$	Vanillyl acetamide	M	Bi.	+		110° (115° calc.)		(24)
3732	$C_{10}H_{14}$	1, 2, 4, 5-Tetramethylbenzene	M	Bi.	−	87° 22′		Ax pl. b(010); X∧c = 0° 54′ in obtuse ∠β	(G)
	$C_{10}H_{14}O_3Br$	*d*-Bromopseudonitrocamphor	R.	Bi	+	79° (apprx.)		Ax pl c(001); Z∥a	(G)
3742	$C_{10}H_{14}OBr_2$	*d*-*α*, *α*′-Dibromocamphor	R.	Bi	−	56° 5′	90° 38′	Ax pl a(100); X∥b	(G)
	$C_{10}H_{14}OBr_2$	*d*-*α*, *β*-Dibromocamphor	R	Bi	−	77° 51′		Ax pl b(010), X∥c	(G)
	$C_{10}H_{14}OCl_2$	*d*-*α*, *π*-Dichlorocamphor	R	Bi	+		62° 18′	Z∥c	(G)
	$C_{10}H_{14}O_3SCl_2$	*d*-*α*-Chloro-*π*-camphosulfonic chloride	R	Bi.		59° (apprx.)		Ax pl a(100); Z∥b	(G)
	$C_{10}H_{14}O_6N_2S_2$	Ammonium naphthalene-1, 5-disulfonate	M	Bi		49° 40′		Ax. pl. ⊥(010)	(41)
3756	$C_{10}H_{14}O$	Thymol	Trig	Un	+				(G)
	$C_{10}H_{14}O_3$	*d*(*l*)-Camphoric anhydride	R.	Bi	−		31° 20′ (red)	Ax pl a(100), X∥c	(G)
	$C_{10}H_{14}O_4$	Tetramethylapionol	R	Bi	+	49° 13′	80° 1′	Ax pl a(100), Z∥c	(G)
	$C_{10}H_{14}O_5$	Methyl *α*-anhydrocamphoronate	R.	Bi	−		120° (apprx.)	Ax pl a(100), X∥b	(G)
	$C_{10}H_{14}O_5$	Methyl *β*-anhydrocamphoronate	R.	Bi.	−		33° (apprx.)	Ax pl a(100); X∥b	(G)
	$C_{10}H_{14}O_6$	Dimethyl diacetylracemate	R	Bi	+	62° 36′	103° 29′	Ax. pl. c(001); Z∥b	(G)
3779	$C_{10}H_{15}OBr$	*d*-*β*-Bromocamphor	R.	Bi	+	76° (apprx.)		Ax. pl a(100); Z∥c	(G)
	$C_{10}H_{15}O_2N_2Br$	*α*-Bromopernitrosocamphor	R	Bi	+		99° 28′	Ax. pl b(010); Z∥c	(G)
	$C_{10}H_{15}O_2N_2Br$	*β*-Isobromopernitrosocamphor	R	Bi	+		69° 20′	Ax pl a(100); Z∥c	(G)
	$C_{10}H_{15}OBr_3$	*d*(*l*)-Dihydrocarvone tribromide	R.	Bi	+		59° 45′	Ax. pl (100); Z∥c	(G)
	$C_{10}H_{15}O_4SBr$	*d*-*π*-Camphoricsulfonyl bromide	R.	Bi	+		35°		(G)
	$C_{10}H_{15}O_4SCl$	*d*-*π*-Camphoricsulfonyl chloride	R.	Bi	+		45° (apprx.)		(G)
	$C_{10}H_{15}O_7N$	*l*-Ratanhin sulfate	R.	Bi			75° (apprx.)	Ax pl c(001)	(G)
	$C_{10}H_{16}NBr$	Diethylaniline hydrobromide	M.	Bi.	−	77° 33′		Ax pl ⊥b(010); X∧c = 70° in obtuse ∠β	(G)
	$C_{10}H_{16}OBr_2$	Pinol dibromide	R.	Bi	−		131° 21′	Ax pl a(100), X∥c	(G)
	$C_{10}H_{16}NI$	*p*-Tolyltrimethylammonium iodide	R.	Bi	+		20° 36′	Ax pl b(010); Z∥c	(G)
3867.1	$C_{10}H_{16}O_3$	*dl*-Pinonic acid	M.	Bi		88° 32′		Ax pl b(010); Z∧c = 57° in acute ∠β	(G)
	$C_{10}H_{16}O_3$	*d*-*α*-Thujene ketonic acid	R.	Bi	+		74° 14′	Ax. pl. a(100); Z∥c	(G)
	$C_{10}H_{16}O_5$	Isoketocamphoric acid	M.	Bi	+		80° (apprx.)	Ax pl. b(010); Z nearly ⊥c(001)	(G)
3873	$C_{10}H_{16}O_5.H_2O$	*l*-Cineolic acid	R.	Bi.	−	25° 30′		Ax. pl b(010); X∥c	(G)
3886 1	$C_{10}H_{17}O_3N$	*dl*-*α*-Pinonoxime	M.	Bi.	+		60°–70°	Ax pl. b(010); Z∧c = 10° in acute ∠β	(G)

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	$C_{10}H_{16}O_2$	2-Hydroxy-Δ′, 3-*p*-menthenone.	M	Bi.	−			X ∧ c = 63° 6′ in obtuse ∠β	(G)
	$C_{10}H_{18}O_6$	α, α′-Methylisopropyl-α, α′-dihydroxyadipic acid	?	Bi.	−		75°		(87)
	$C_{10}H_{19}ON$	Δ⁴, 8-Methylnonenyl amide		Bi	+		60°		(88)
3964	$C_{10}H_{20}ONCl$	Lupinine hydrochloride	R.	Bi.	+	50° 18′	102° 10′	Ax. pl. c(001), Z‖a	(G)
	$C_{10}H_{20}O_6N_2\ 3H_2O$	α-2, 5-Dimethylpiperazine tartrate	M	Bi			80° (apprx)	Ax pl. ⊥b(010)	(G)
	$C_{10}H_{20}NPS$	Triethylallylphosphothiourea	M.	Bi	−	72° 30′		Ax pl. b(010), X ∧ c = 24° in acute ∠β	(G)
	$C_{10}H_{20}O_2$	*cis*-Terpine hydrate	R	Bi	+	77° 27′		Ax pl b(010), Z‖a	(G)
3980	$C_{10}H_{20}O_2$	*trans*-Terpine	M	Bi	+		74° 15′	Ax pl ⊥b(001); Z ∧ c = 5° 6° in acute ∠β	(G)
	$C_{11}H_6O_{10}\ 5H_2O$	Benzenepentacarboxylic acid .	R	Bi	−		57° 30′	Ax pl b(010), X‖c	(G)
	$C_{11}H_8N_4O_3$	9-Phenyluric acid .		Un					(4.8)
	$C_{11}H_9O_4Br$	Phenylbromoparaconic acid	R	Bi		56° 50′		Ax pl b(010); Z‖a	(G)
	$C_{11}H_9O_2N$	Citraconanil	M	Bi	+		14° 56′	Ax pl b(010)	(G)
	$C_{11}H_{11}O_3Cl_3$	Trichloromethyl-*o*-methoxyphenylcarbinol acetic ether	M	Bi	−		75° 11′	Ax pl. ⊥b(010)	(G)
	$C_{11}H_{11}O_2N$	Glutaric anilne	M	Bi			90°	Ax pl. (010)	(88)
4043 1	$C_{11}H_{11}ON_2Br$	4-Bromoantipyrine	Ditrig	Un					(G)
	$C_{11}H_{11}O_2N$	β-Benzyl malimide	R	Bi	-	62° 66°		Ax pl b(010); X‖c	(G)
4053	$C_{11}H_{11}O_4N$	Ethyl *o*-nitrocinnamate	R	Bi			57° 40′	Ax pl c(001); X‖a	(G)
	$C_{11}H_{11}ON_2$	4-Iodoantipyrine	Trig	Un					(G)
	$C_{11}H_{12}O_2Br_2$	Ethyldibromocinnamate	M	Bi	−	86° (apprx)		Ax pl b(010); X ∧ c = 7° in acute ∠β	(G)
4058	$C_{11}H_{12}ON_2$	Antipyrine	?	Bi		54° 20′	103° 21′		(L-B)
	$C_{11}H_{12}O_2N_2$	4-Hydroxyantipyrine	M.	Bi			116° 23′	Ax pl b(010); Z ⊥ c(001)	(G)
	$C_{11}H_{13}O_3N$	Methyl phenaceturate	R	Bi				Ax pl b(010)	(G)
4086	$C_{11}H_{14}ON_2$	Cytisine	R	Bi	+	61° 36.5′		Ax pl a(100); Z‖c	(G)
	$C_{11}H_{14}O_2N_2$	Ethyl α-phenylhydrazine pyroracemate	M	Bi	−			Ax pl ⊥b(010); X ∧ c = 47° 4′ in acute ∠β	(G)
	$C_{11}H_{14}O_5$	Methyl 3, 4, 5-methoxybenzoate	M	Bi.			113° 13′ (white)	Ax pl. ⊥b(010)	(G)
	$C_{11}H_{15}ON_2Br\ H_2O$	Cytisine hydrobromide	M	Bi	-	87° (apprx)		Ax pl b(010)	(G)
	$C_{11}H_{16}O_5NCl$	Methyl 3, 4, 5-trimethoxy-2-aminobenzoate	R	Bi	-		70° (apprx)	Ax pl c(001); X‖a	(G)
	$C_{11}H_{15}ON_2Cl\ H_2O$	Cytisine hydrochloride	M.	Bi		72° (apprx)		Ax. pl b(010); Z ∧ c = 55° in obtuse ∠β	(G)
	$C_{11}H_{15}O_3N$	Vanillyl propionamide	R	Bi	−		100° (98° calc)		(84)
	$C_{11}H_{15}O_3N$	Pyrocatechol carboxyl diethylamide	M.	Bi	+		7° 56′	Ax. pl. b(010); Z ∧ c = 55° in obtuse ∠β	(G)
	$C_{11}H_{15}O_7N$	*s*-Benzylhydroxylamine ditartrate	R	Bi			90° (apprx)	Ax pl. a(100); Z‖b	(G)
	$C_{11}H_{15}O_3N_3$	Nitrosoamylene nitroaniline	R.	Bi	+	82° 51′		Ax pl. b(010); Z‖c	(G)
	$C_{11}H_{15}O_4N_3\ H_2O$	Cytisine nitrate	M.	Bi	+	38° 49′		Ax pl b(010)	(G)
	$C_{11}H_{16}ON_2$	Amylene nitraniline	R	Bi	+	88° 21′		Ax pl a(100); Z‖c	(G)
	$C_{11}H_{16}O_6$	Dimethyl camphoronate	R.	Bi.	−		50° (apprx)	Ax pl. b(010); X‖a	(G)
	$C_{11}H_{17}ON_2Cl$	Amylene nitraniline hydrochloride	M.	Bi	+	75° 41′		Ax pl. ⊥b(010)	(G)
	$C_{11}H_{18}NBr$	Diethyl-*p*-toluidine hydrobromide	M.	Bi	+	69° 41.5′		Ax pl ⊥b(010)	(G)
	$C_{11}H_{18}O_6$	Ethyl camphoronate	M	Bi			56° (apprx)	Ax pl. ⊥b(010)	(G)
	$C_{11}H_{18}O_8$	Triethyl desoxalate	M	Bi	−		61° 50′	Ax pl ⊥b(010)	(G)
	$C_{11}H_{20}ON_2$	Terpinene nitrolmethylamine	M	Bi		55° 20′	93° 56′	Ax pl. ⊥b(010); Z ∧ c = 31° in obtuse ∠β	(G)
	$C_{11}H_{21}O_3N$	*N*-Methyl-2, 2, 6, 6-tetramethyl-4-hydroxypiperidine carboxylic acid	R	Bi	-	82° 31′		Ax. pl. a(100); X‖b	(G)
4184	$C_{12}H_8$	Acenaphthylene	R	Bi	+	70° 16′	114° 46′	Ax. pl. a(100); Z‖b	(G)
4185 1	$C_{12}H_8Br_2$	*p*, *p*′-Dibromodiphenyl	M.	Bi		50° 60° (apprx)		Ax pl. ⊥b(010)	(G)
4218	$C_{12}H_{10}$	Acenaphthene	R	Bi	+	70° 26′	115° 40′	Ax pl. a(100); Z‖b	(G)
4221.1	$C_{12}H_{10}ICl$	Diphenyliodonium chloride	M.	Bi			Large	Ax. pl. b(010)	(G)
4225	$C_{12}H_{10}N_2$	Azobenzene	M.	Bi	+		59° 5′	Ax pl. ⊥b(010); Z ∧ c = 62° in acute ∠β	(G)
	$C_{12}H_{10}ON_2$	α-Benzoylpyridine oxime	R.	Bi.		66°		Ax pl. b(010); Z‖a	(G)
	$C_{12}H_{10}ON_2$	γ-Benzoylpyridine oxime	M	Bi		28°		Ax pl b(010); Z ∧ c = 62° in obtuse ∠β	(G)
	$C_{12}H_{10}O_4S_4$	Benzenesulfone trisulfide	Tet	Un.					(G)
4261	$C_{12}H_{10}S_2$	Diphenyl disulfide	R.	Bi.	−		85° (apprx)	Ax. pl. b(010); X‖c	(G)
	$C_{12}H_{11}O_3SBr$	Ethyl 1, 5-bromonaphthalene sulfonate	R.	Bi			29° 52′	Ax pl. a(100); Z‖b	(G)
	$C_{12}H_{11}O_3SCl$	Ethyl 1, 5-chloronaphthalene sulfonate.	M.	Bi.		42° (apprx)		Ax pl b(010)	(G)
	$C_{12}H_{11}ON$	α-Phenylpyridyl carbinol	R.	Bi		65°		Ax. pl. c(001); Z‖a	(G)

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4272	$C_{12}H_{11}O_2NS$	Benzenesulfanilide	Tet	Un					(G)
	$C_{12}H_{17}O_3N$	Vanillyl *n*-butyramide	Tri	Bi.	+		Very large		(24)
	$C_{12}H_{17}O_3N$	Vanillyl isobutyramide	R.	Bi.	−		18° (17° 48′ calc.)		(24)
	$C_{12}H_{12}O_3$	Ethyl β-methylcoumarilate	R	Bi			72° 34′	Ax. pl b(010); Z∥c	(G)
	$C_{12}H_{12}O_3$	*cis*-Dimethylsuccinic acid	R	Bi			124° 4′ (Hg, yellow)	Ax. pl. (010); Bx$_o$ ⊥(001)	(28)
	$C_{12}H_{18}O_3$	Acetotetrahydrocinchoninic acid	R	Bi	−		12° 24′	X∥b	(G)
	$C_{12}H_{28}NI$	Tetrapropyl ammonium iodide	R	Bi	−		30° 1′	Ax pl. (100); X∥b	(G)
	$C_{12}H_{16}NI$	1, 3, 3-Trimethyl-2-methylene indoline hydriodide	R	Bi	−	23° 48′ (red)	57° 16′ (red)	Ax pl. c(110); X∥b	(G)
	$C_{12}H_{14}ON_2$	1-Phenyl-3-methyl-4-dimethylpyrazolone	M	Bi		74° 2′		Ax. pl. ⊥b(010)	(G)
	$C_{12}H_{14}ON_2$	4-Methylantipyrine	M	Bi		86° (apprx)		Ax. pl. b(010); Z∧c = 47° in acute ∠β	(G)
4318.1	$C_{12}H_{14}O_3$	Ethyl *p*-methoxycinnamate	M	Bi				Ax. pl. b(010)	(G)
	$C_{12}H_{14}O_4$	Dimethyl phenylsuccinate	M	Bi	+		10° (apprx)	Ax. pl. ⊥b(010)	(G)
	$C_{12}H_{15}ON_2I$	1-Phenyl-3-methyl-5-methoxypyrazole 2 methiodide	M	Bi.	−	72°		Ax pl. b(010); X∧c = 73° in obtuse ∠β	(G)
	$C_{12}H_{15}ON_2I$	Antipyrine pseudomethiodide				75° 41′			(L-B)
	$C_{12}H_{15}ON_2I$	Antipyrine pseudoethiodide	M	Bi	+	74° 45′		Ax. pl b(010); Z∧c = 84° 30′ in obtuse ∠β	(G)
	$C_{12}H_{15}ON$	7-Isopropylhydrocarbostyril	R	Bi		61° 51′		Ax pl b(010); Z∥a	(G)
4330.1	$C_{12}H_{15}O_3N$	Ethyl phenaceturate	R	Bi				Ax pl. b(010)	(G)
	$C_{12}H_{15}O_3N$	Vanillyl crotonylamide	R	Bi.	+		Large		(24)
	$C_{12}H_{16}O_3$	2, 5-Dioxyacetophenone diethyl ether	Tri	Bi			85° (apprx)	Ax pl ⊥c(001)	(G)
	$C_{12}H_{17}O_2N_3$	Nitrosoamylenenitrol *p*-toluidine	R	Bi	+	77° 50′	167° 37′	Ax pl ⊥b(010); Z∥c	(G)
	$C_{12}H_{19}ON_2Cl$	Amylenenitrol *p*-toluidine hydrochloride	M	Bi	+	59° 26′	97° 30′	Ax pl ⊥b(010); Z∧c = 12° in obtuse ∠β	(G)
	$C_{12}H_{18}ON_2$	Amylenenitrol-*p*-toluidine	M	Bi	−		72° 40′	Ax pl b(010); X∧c = 35° in acute ∠β	(G)
	$C_{12}H_{16}O_4$	Dimethylcantharidin	R	Bi	+		116°	Ax pl. b(010)	(G)
4368.3	$C_{12}H_{18}O_6$	Diethyl 1, 1-diacetosuccinate	M.	Bi	+	64° (apprx)		Ax pl b(010)	(G)
	$C_{12}H_{20}O$	Matico camphor	Trig	Un.					(G)
	$C_{12}H_{20}OS_2$	Methyl *l*-bornyl xanthate	R	Bi	−	33° 24′		Ax. pl. b(010); X∥a	(G)
	$C_{12}H_{22}ON_2$	Terpinene nitrolethylamine	M	Bi.		70° 53′	128° 32′	Ax pl. ⊥b(010); Z∧c = 26° in obtuse ∠β	(G)
4394	$C_{12}H_{22}O_{11}.H_2O$	Lactose	M	Bi.	−		33° 35′	Ax pl. ⊥b(010); X∧c = 10° 11° in obtuse ∠β	(G)
4396	$C_{12}H_{22}O_{11}$	Saccharose	M	Bi	−	48° 0′	79° 7′	Ax pl b(010); X∧c = 67° 45′ in obtuse ∠β	(G)
4397	$C_{12}H_{22}O_{11}\ 2H_2O$	Trehalose	R	Bi	+	50° 16′	78° 56′	Ax pl b(010), Z∥c	(G)
	$C_{12}H_{23}O_6N\ 2H_2O$	*d*-Coniine ditartrate	R	Bi	+		43° 33′	Ax pl. a(100); Z∥c	(G)
	$C_{12}H_{24}O_{12}N_6\ 9H_2O$	Ammonium mellitate	R	Bi	−		17° (apprx)	Ax. pl b(010) (red), X∥c	(G)
	$C_{13}H_8O_3Cl_2$	Phenyl 3, 5-dichlorosalicylate	R	Bi	−		70° 35′	Ax pl. a(100); X∥c	(G)
4434	$C_{13}H_9N$	Acridine	R				117° (apprx)	Ax pl. c(001); Z∥a	(G)
	$C_{13}H_{10}N_2$	Benzenyl-*o*-phenylenediamine	M	Bi	+		63°	Ax. pl. b(010); Z nearly ⊥c(001)	(G)
4454	$C_{13}H_{10}O_2$	*p*-Hydroxybenzophenone	R	Bi	−		96° 20′	Ax. pl b(010); X∥a	(G)
	$C_{13}H_9O_2Br$	Phenyl *m*-bromobenzoate	R	Bi	+		41° 4′	Ax pl. b(010), Z∥c	(G)
	$C_{13}H_{11}O_4NS$	*p*-Aminobenzophenone-*p*′-sulfonic acid	M	Bi				Ax. pl. ∥(010); Z = c	(5)
	$C_{13}H_{12}O_4Br_2$	Ethyl dibromohydroxydimethylisocoumarilate	M	Bi			80° (apprx)	Ax pl b(010); Z∧c = 30° in obtuse ∠β	(G)
	$C_{13}H_{12}O_4Cl_2$	Ethyl dichlorohydroxydimethylcoumarilate	M	Bi			75° (apprx)	Ax. pl. ⊥b(010); Z∧c = 30°-35° in obtuse ∠β	(G)
4500	$C_{13}H_{12}ON_2$	*p*-Hydroxy-*p*′-methylazobenzene	M.	Bi	−		52° 30′ (apprx)	Ax pl b(010); X∧c = 57° in obtuse ∠β	(G)
	$C_{13}H_{12}O_3N_4$	1, 3-Dimethyl-9-phenyluric acid		Bi			Large		(21)
	$C_{13}H_{12}O_3N_4$	1, 3-Dimethyl-9-phenylpseudouric acid		Bi			Large		(21)
4509	$C_{13}H_{12}O_3S$	Phenyl *p*-toluene sulfonate	R	Bi	−		84° 19′	Ax. pl. a(100); X∥b	(G)
	$C_{13}H_{13}O_4N$	Acetanilinopyrotartaric anhydride	M.	Bi			86° 2′	Ax. pl. ⊥b(010); Z ⊥c(001)	(G)
	$C_{13}H_{14}O_4$	Ethyl hydroxydimethylisocoumarilate	R	Bi	+		65° (apprx)	Ax. pl. c(001); Z∥a	(G)
4530.1	$C_{13}H_{16}ON_2$	4-Ethylantipyrine	M.	Bi			30° (apprx)	Ax. pl. b(010); Z∧c = 40° in obtuse ∠β	(G)
4530.2	$C_{13}H_{16}ON_2$	1-Phenyl-2-propyl-3-methylpyrazolone	M.	Bi		52° 50′	79° 59′	Ax pl. ⊥b(010); Z∥b	(G)
	$C_{13}H_{16}O_{10}$	Glycogallin	M	Bi.	−		55° (apprx.)	Ax. pl. b(010); X∧c = 16° in obtuse ∠β	(G)
	$C_{13}H_{17}ON_2I$	1-Phenyl-3-methyl-5-ethoxypyrazole-2-methiodide	M.	Bi.	−		88° (apprx.)	Ax. pl. ⊥b(010); X∥b	(G)

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	$C_{13}H_{20}NCl$	2-Methyl-3, 3-diethyl 2, 3-dihydroindol hydrochloride	M	Bi	–	81° 51′			(G)
	$C_{13}H_{20}NI$	Methylethylallyl-*p*-tolylammonium iodide	R	Bi			80° (apprx)	Ax pl c(001), Z∥c	(G)
	$C_{13}H_{20}O_8$	Pentaerythritol tetraacetate	Tet	Un					(19)
	$C_{13}H_{22}OS_2$	Ethyl *dl*-bornylxanthate	R	Bi	–		51° 16′	Ax pl b(010)	(G)
	$C_{14}H_7O_4N_2Cl_5$	Dinitrodichlorodiphenyltrichloroethane	M	Bi	–		58° (apprx)	Ax pl b(010); X∧c = 28° 30′ in obtuse ∠β	(G)
	$C_{14}H_8Cl_2Br_2$	1, 1-Di(bromophenyl)-2-dichloroethylene	R	Bi	+		34° 22′	Ax. pl. c(001), Z∥a	(G)
	$C_{14}H_8Cl_4$	1, 1-Di(chlorophenyl)-2-dichloroethylene	R	Bi	+		34° 26′	Ax pl b(010), Z∥a	(G)
	$C_{14}H_9Cl_3Br_2$	1, 1-Di(bromophenyl)-2-trichloroethane	R	Bi	+		62° 12′	Ax pl c(001), Z∥b	(G)
4650	$C_{14}H_{10}$	Diphenylacetylene	M	Bi			42° (red)	Ax pl ⊥b(010)	(G)
	$C_{14}H_{10}Cl_2$	1, 1-Diphenyl-2-dichloroethylene	M	Bi	–		30° 50′	Ax pl ⊥b(010)	(G)
4636 1	$C_{14}H_{10}O_2N_2$	Phthalylphenylhydrazine (orange yellow)	M	Bi			85° (apprx)	Ax pl. ⊥b(010)	(G)
4672	$C_{14}H_{10}O_2$	Benzil	Trig	Un					(G)
4681	$C_{14}H_{10}O_3$	Disalicylaldehyde	M	Bi					(G)
4688	$C_{14}H_{10}O_4$	Benzoyl peroxide	R	Bi				Ax pl. a(100); Z∥b	(G)
	$C_{14}H_{11}Br_3$	Diphenyltribromoethane	M	Bi	+		110°	Ax pl b(010)	(G)
4705	$C_{14}H_{11}O_3N$	Dibenzohydroxamic acid	R	Bi	+		54° 45′ (red)	Ax pl a(100); Z∥b	(G)
4708	$C_{14}H_{12}$	Stilbene	M	Bi	+		91° 33′	Ax pl ⊥b(010), Z∧c = 60° in acute ∠β	(G)
	$C_{14}H_{12}N_4$	1, 5-Diphenyl-3-iminotriazoline	M	Bi				Ax pl b(010)	(G)
	$C_{14}H_{12}O$	Phenyl *p*-tolyl ketone	M	Bi	–		35° 15′	Ax pl ⊥b(010), X∧c = 36° 57′ in acute ∠β	(G)
	$C_{14}H_{13}N$	*o*-Iminodibenzyl	M	Bi			69° 58.5′	Ax pl ⊥b(010)	(G)
4748	$C_{14}H_{13}ON$	*N*-Benzoyl-*o*-toluidine	R	Bi	+	87° 33′		Ax pl a(100)	(G)
4749	$C_{14}H_{13}ON$	*N*-Benzoyl-*m*-toluidine	M	Bi			38° 10′	Ax pl ⊥b(010)	(G)
4750	$C_{14}H_{13}ON$	*N*-Benzoyl-*p*-toluidine	R	Bi		73° 43′		Ax pl c(001), Z∥b	(G)
4752	$C_{14}H_{13}ON$	*N*-Diphenylacetamide	R	Bi	+	52° 2′		Ax pl c(001), Z∥a	(G)
	$C_{14}H_{14}O_2N_2$	*o*-Nitrobenzyl-*o*-toluidine	R	Bi			49° (red)	Ax pl a(100), Z∥b	(G)
	$C_{14}H_{13}O_2N_3$	ω, ω′-Diphenylbiuret		Bi					(8,9)
	$C_{14}H_{14}ON_2$	Phenyl-*o*-phenetol	M	Bi	–	68°	154° (apprx)	Ax pl ⊥b(010); X∧c = 39° in acute ∠β	(G)
4783	$C_{14}H_{14}O_2$	Isohydrobenzoin	M	Bi	–	84° 59′		Ax pl ⊥b(010)	(G)
	$C_{14}H_{14}O_2$	1, 2-Dihydroxyphenylethane	R	Bi	+		122° 14′	Ax. pl (100)	(9)
	$C_{14}H_{14}O_2$	*o*, *o*′-Dimethoxydiphenyl	R	Bi			5°	Ax pl (010); Bx_a ⊥c(001)	(20)
	$C_{14}H_{14}O_2S_2$	Tolyl *p*-toluol thiosulfonate	M	Bi			19° 29′	Ax pl ⊥b(010); Z∥b	(G)
	$C_{14}H_{14}O_4S_5$	*p*-Toluenesulfone trisulfide	Tet	Un					(G)
4787	$C_{14}H_{14}S$	Dibenzyl sulfide . .	R	Bi	–	67° 38′		Ax pl. b(010); X∥c	(G)
	$C_{14}H_{15}NO_4Br\ H_2O$	Dipyridinebetaine hydrobromide	R	Bi	+	87° 30′		Ax pl c(001); Z∥b	(G)
	$C_{14}H_{15}O_4NCl\ H_2O$	Dipyridinebetaine hydrochloride	R.	Bi	+	83° 52′		Ax pl c(001); Z∥b	(G)
	$C_{14}H_{16}ONCl$	Diphenylhydroxyethylamine hydrochloride	H	Un	–				(G)
	$C_{14}H_{18}O_6$	β-Methyltetramethoxycinnamic acid	M.	Bi	+		102° 4′	Ax pl ⊥b(010); Z⊥c(001)	(G)
	$C_{14}H_{19}O_7N$	Thallin tartrate.	R	Bi	+	78° 14′		Ax pl a(100)	(G)
	$C_{14}H_{20}O_2NI$	Ethyl tetrahydroquinoline-*N*-acetate methiodide	M	Bi.			65° 70′	Ax. pl. ⊥b(010)	(G)
	$C_{15}H_{10}O_2$	Phenylcoumarin	M	Bi				Ax. pl b(010); Z∧c = 30° 15′ in acute ∠β	(G)
	$C_{15}H_{12}N_2$	3, 5-Diphenylpyrazole	M	Bi			43° 30′	Ax pl ⊥b(010); Z∧c = 44° in acute ∠β	(G)
	$C_{15}H_{13}O_3N$	*syn*-Benzoylbenzohydroxamic methyl ether	R	Bi	–	70° 10′		Ax pl. a(100); X∥c	(G)
	$C_{15}H_{12}O_3$	*o*-Hydroxydibenzoylmethane	M	Bi	+		75°	Ax. pl (010); Bx_a∥c-axis	(22)
4919	$C_{15}H_{14}O_3$	Methyl benzilate	M	Bi	–		74° 52′	Ax. pl. ⊥b(010)	(G)
	$C_{15}H_{15}O_3N$	Vanillyl benzoyl amide	R	Bi	–		85° (89° calc)		(24)
	$C_{15}H_{15}O_4NS\ H_2O$	*p*-Dimethylaminobenzophenone sulfonic acid	Tri	Bi			79° (apprx)	Ax pl. ∥m(110)	(G)
	$C_{15}H_{16}O_5$	2, 6, 2′, 5′-Tetrahydroxydiphenylmethyl ethyl ether	R	Bi		79° 11′		Ax pl. a(100); Z∥b	(G)
4936 1	$C_{15}H_{16}O_6\ H_2O(?)$	Picrotoxinin	R.	Bi				Ax pl c(001)	(G)
	$C_{15}H_{18}O_2$	Hyposantonin	R	Bi			46° (apprx)	Ax pl b(010); Z∥b(?)	(G)
4943	$C_{15}H_{18}O_3$	Santonin	R	Bi	+		41° 17′ 43° 33′	Ax. pl. a(100); Z∥b	(27)
	$C_{15}H_{18}O_3$	Santonide	R	Bi	+	67° 1′ (red)		Ax. pl. a(100); Z∥c	(G)
	$C_{15}H_{18}O_3$	Parasantonide	R	Bi	–		59° 25′ (red)	Ax pl a(100); X∥c	(G)
	$C_{15}H_{18}O_6$	Triethyl trimesate	H	Un	–				(G)
	$C_{15}H_{19}O_2N_2Cl_3$	Butyl chloral antipyrine	Tri	Bi	–		110°		(G)
	$C_{15}H_{20}O_3$	Hydrosantonide	R	Bi	+	55° 10′ (red)	93° 43′ (red)	Ax. pl a(100); Z∥c	(G)

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	$C_{15}H_{20}O_4$	Santonic acid	R	Bi.		87° 40′		Ax. pl. a(100)	(G)
	$C_{15}H_{20}O_4$	Metasantonic acid	R.	Bi.	+		68° 25′ (red)	Ax. pl. a(100); Z‖c	(G)
	$C_{15}H_{20}O_4$	Parasantonic acid	R.	Bi	−	88° 13′ (red)		Ax. pl. a(100); X‖c	(G)
	$C_{15}H_{21}O_3N$	α-Isopropylglutaranilic acid	R	Bi.	+		117° 15′	Ax. pl. b(010); Z‖c	(G)
4960	$C_{15}H_{21}O_2N_3$	Physostigmine	R	Bi	−	77° 42′		Ax. pl. b(010); X‖c	(G)
	$C_{15}H_{22}O_4$	Hydrosantonic acid	R	Bi	+		100° (red)	Ax. pl a(100); Z‖c	(G)
	$C_{15}H_{22}O_5$	Photosantonic acid	R.	Bi	−		107° 25′ (red)	Ax pl. a(100); X‖c	(G)
	$C_{15}H_{23}O_3N$	Vanillyl n-heptoylamide	M.	Bi.	−		110° (107° calc.)		(24)
	$C_{15}H_{26}O(?)$	Juniperol	Tri (?)	Bi.	−	34° 46′		Ax. pl. nearly ‖b(010); X∧c = 72° in acute ∠β	(G)
	$C_{15}H_{25}O_3N$	Sesquiterpene nitrate	R.	Bi			18° 32′	Ax pl. a(100) (red)	(G)
	$C_{15}H_{26}Cl_2$	l-Cadinene dihydrochloride	R.	Bi	+		50° (apprx)	Ax pl. b(010); Z‖c	(37)
	$C_{15}H_{26}O$	Cypress camphor	R.	Bi	+		61° 30′	Ax pl. b(010); Z‖a	(G)
4997	$C_{15}H_{26}O$	Cedrol	R.	Bi	+		64° 45′	Ax. pl b(010); Z‖a	(G)
	$C_{15}H_{26}O_6$	Triacetone mannite	M	Bi	+	77° 4′	138° 13′	Ax. pl ⊥b(010); Z∧c = 26° 54′ in obtuse ∠β	(G)
5028.1	$C_{16}H_{10}O_3$	Diphenylmaleic anhydride	R.	Bi	+		Small	Ax. pl. a(100); Z‖c	(G)
	$C_{16}H_{11}O_2Br$	2, 3-Diphenyl-3-bromo-Δ′-crotono lactone	M	Bi.			55° (apprx)	Ax. pl. ⊥b(010)	(G)
	$C_{16}H_{12}O_3$	Diphenylsuccinic anhydride	R.	Bi			166° (Li) (apprx)	Ax. pl. b(010); Z‖a	(G)
	$C_{16}H_{13}N_3$	Di-p-dicyanobenzylamine	Tri.	Bi		69° 39′		Ax. pl. ‖c(001)	(G)
	$C_{16}H_{13}O_4N$	α-Benzoyl-β-acetylbenzoylhydroxylamine	M.	Bi	+	75° 20′		Ax pl. ⊥b(010)	(G)
5066.1	$C_{16}H_{14}N_2$	1, 5-Diphenyl-3-methyl pyrazole	M	Bi		68° 22′		Ax pl b(010); Z∧c = 7° in obtuse ∠β	(G)
5067.1	$C_{16}H_{14}O$	Benzylidene-p-tolyl ketone	R.	Bi	+	36° 4′	61° 7′	Ax. pl c(001); Z‖b	(G)
	$C_{16}H_{15}Cl_3$	Di-p-tolyltrichloroethane	M.	Bi	+		85° 5′	Ax. pl. b(010); Z∧c = 4° in acute ∠β	(G)
	$C_{16}H_{15}O_3N$	Ethyl benzohydroxamic benzoate	R	Bi	+		94° 55′	Ax. pl. a(100); Z‖c	(G)
	$C_{16}H_{15}O_3N$	anti-Benzoyl benzohydroxamic ethyl ether	Tri.	Bi.	−		18° 30′ (apprx.)		(G)
	$C_{16}H_{15}O_4N$	Anisoyl p-toluohydroxamic acid	M	Bi.	+	63° 49′	113° 6′	Ax. pl b(010); Z⊥c(001)	(G)
	$C_{16}H_{15}O_4N$	p-Toluyl anisohydroxamic acid	M	Bi.	+	50° 10′	82° 52′	Ax pl b(010); Z∧c = 40° in acute ∠β	(G)
	$C_{16}H_{15}ON_3$	Phenyl styryl ketone	R. (?)	Bi					(13)
	$C_{15}H_{16}N_2$	Acetophenone methylphenylhydrazone	M.	Bi.			Large	Ax pl. b(010); Z⊥a(100)	(G)
5082.4	$C_{16}H_{16}O_2N_2$	Diacetylhydrazobenzene	R	Bi.	−	88° 45′		Ax. pl b(010); X‖a	(G)
	$C_{16}H_{16}O_4N_2$	2-Phenyl-1-allylbenzimidazolium sulfate	M	Bi	+		56° 48′	Ax pl ⊥b(010); Z∧c = 33° 51′ in obtuse ∠β	(G)
	$C_{16}H_{16}O_8N_4$	2, 3-Dinitro-p-xylene + 2, 6-dinitro-p-xylene	R.	Bi	−		38° 36.5′	Ax. pl a(100); X‖c	(G)
	$C_{16}H_{19}O_4N.4H_2O$	l-Benzoylecgonine tetrahydrate.	R.	Bi.			45° (apprx)	Ax pl. a(100); Z‖b	(G)
5131	$C_{16}H_{22}O_3NBr$	Homatropine hydrobromide	R.	Bi	−		69°-70°	Ax pl c(001); X‖b	(G)
	$C_{16}H_{22}O_3N_2$	Antipyrine isovalerianate	M.	Bi.		68° (apprx)		Ax pl c(001); Z∧c = 17° in obtuse ∠β	(G)
5135.1	$C_{16}H_{22}O_4$	Methyl santoate	R.	Bi	−	74° 24′ (red)	134° 12′ (red)	Ax pl. a(100); X‖c	(G)
	$C_{16}H_{22}O_4$	Methyl metasantoate	M.	Bi		90°		Ax pl. ⊥b(010)	(G)
	$C_{16}H_{22}O_4$	Methyl parasantoate	R.	Bi	−		58° 25′ (red)	Ax pl. a(100); X‖c	(G)
	$C_{16}H_{21}O_4Br$	β-Bromoacetyltetraethylphloroglucinol	M.	Bi.	+		50° (apprx)	Ax. pl. ⊥b(010)	(G)
	$C_{16}H_{23}O_6N.H_2O$	l-Phenyl-α′-methylpiperidine d-tartrate	R	Bi.	−		55° 42′	Ax. pl. b(010); X‖c	(G)
5142.1	$C_{15}H_{26}O$	Guaiol (Champacol)	Trig	Un.					(G)
	$C_{17}H_{17}O_4N$	Ethyl anisohydroxamic benzoate	M.	Bi	+	71° 55′		Ax. pl ⊥b(010); Z‖b	(G)
	$C_{17}H_{17}O_4N$	syn-Anisoylbenzohydroxamic ethyl ether	M.	Bi	−		66° 13′	Ax. pl ⊥b(010); X∧c = 55° 30′ in acute ∠β	(G)
	$C_{17}H_{17}O_4N$	anti-Benzoylanishydroxamic ethyl ether	M	Bi	−		63° 7′	Ax. pl. ⊥b(010)	(G)
5202	$C_{17}H_{19}O_3N.H_2O$	Morphine	R.	Bi	−		125° (apprx)	Ax. pl. ⊥ to elongation	(39)
	$C_{17}H_{20}NBr$	α-Benzylphenylallylmethylammonium bromide	R.	Bi		30°-40° (apprx)		Ax. pl. c(001); Z‖b	(G)
	$C_{17}H_{20}NCl$	α-Benzylphenylallylmethylammonium chloride	R.	Bi.			100° (apprx.)	Ax. pl. c(001); Z‖b	(G)
	$C_{17}H_{20}ON_2$	Oxymethylenecamphor phenylpyrazole	M.	Bi.	+		26° 40′	Ax. pl. ⊥b(010)	(G)
	$C_{17}H_{20}ON_2$	Pseudoephedrine phenylthiourea	R	Bi.	+		76° 15′	Ax. pl. c(001); Z‖b	(G)
	$C_{17}H_{20}ON_2S$	Ephedrine phenylthiourea	R.	Bi.	+	66° 25′	89° 43′	Ax. pl c(001); Z‖a	(G)
5213.1	$C_{17}H_{20}O_2$	(p-Dianisyl)dimethylmethane	R	Bi.	−	89° 54.5′			(G)
5226	$C_{17}H_{22}O_4NBr.3H_2O$	Hyoscine hydrobromide	R.	Bi	−		101° 12′	Ax pl b(010); X‖c	(G)
5228	$C_{17}H_{22}O_4NCl$	Cocaine hydrochloride		Bi.	−		Large (> 120°)	Ax. pl. (010)	(37)

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	$C_{17}H_{23}O_3Br$	**Ethyl *d(l)*-bromosantonigate**	R.	Bi	+		123° 26′	Ax pl a(100); Z∥c	(G)
	$C_{17}H_{23}O_4N$	**Menthyl-*o*-nitrobenzoate**	R.	Bi	–	30° 32′	47° 24′	Ax pl b(010), X∥c	(G)
	$C_{17}H_{22}O_3N_2$	**2-Keto-6-methyl 4-(*p*-isopropyl phenyl)-1, 2, 3, 4-tetrahydropyrimidine-5-ethyl carboxylate.**	M	Bi	+	44° (apprx.)		Ax pl b(010)	(G)
	$C_{17}H_{24}ON_2$	*α*-Dipentene nitrolbenzylamine	M	Bi	+		108° 14′	Ax pl b(010); Z ∧ c = 18° in acute ∠β	(G)
	$C_{17}H_{24}ON_2$	*d(l)*-Pinene nitrolbenzylamine	R	Bi	+		89° 0′	Ax pl c(001); Z∥a	(G)
	$C_{17}H_{24}O_2$	1, 1, 2-Trimethyl-2-phenylcyclopentane-3-ethyl carboxylate.	M	Bi	-	65° 20′		Ax pl b(010); X ∧ c = 50° in acute ∠β	(G)
5244	$C_{17}H_{24}O_2$	Menthyl benzoate	R	Bi			70° (apprx)	Ax pl c(001); Z∥b	(G)
5244 1	$C_{17}H_{24}O_4$	Ethyl santoate	R	Bi	+	84° 0′ (red)		Ax pl a(100); Z∥c	(G)
	$C_{17}H_{24}O_4$	Ethyl parasantoate	R	Bi			35° 35′ (red)	Ax pl a(100); X∥c	(G)
	$C_{17}H_{24}O_{10}$	Ethyl tetraacetylquinate	R	Bi		79° 58′		Ax pl. a(100); X∥c	(G)
	$C_{18}H_{12}O_{15}N_3S_3Bi\ 7H_2O$	Bismuth *m*-nitrobenzene sulfonate	M.	Bi	+			Ax pl b(010); Z ∧ c = about 93° in obtuse ∠β	(G)
	$C_{18}H_{12}O_8N_4$	γ-Benzoylpyridine picrate	M	Bi		62°		Ax pl ⊥b(010), Z ∧ c = 65° in obtuse ∠β	(G)
	$C_{18}H_{14}O_7N_4$	*α*-Benzylpyridine picrate	M	Bi		10°		Ax pl. b(010)	(G)
	$C_{18}H_{14}O_7N_4$	γ-Benzylpyridine picrate	Tri	Bi		28°			(G)
	$C_{18}H_{16}O_4$	Diacetyl dihydroxy stilbene	M	Bi	–	81° 30′		Ax pl. ⊥b(010); X ∧ c = 13° in acute ∠β	(G)
5304	$C_{18}H_{16}O_7$	*d(l)*-Usnic acid	R	Bi.	+			Ax pl. a(100); Z∥c	(G)
	$C_{18}H_{18}O$	Diethylanthrone	R	Bi.			60° (apprx)	Ax pl c(001); Z∥a	(G)
	$C_{18}H_{18}O_4$	Hydrobenzoin diacetate	M	Bi		85° (apprx)		Ax pl b(010); Z ∧ c = 12° in obtuse ∠β	(G)
	$C_{18}H_{18}O_4$	Isohydrobenzoin diacetate	R	Bi	-	80° 54′		Ax pl b(010); X∥c	(G)
	$C_{18}H_{20}$	*sym*-Tetramethylanthracene hydride	R	Bi	-		79° 83°	Ax pl b(010) (blue); X∥c	(G)
	$C_{18}H_{20}$	Tetramethyl-*p*-stilbene	M	Bi	+		24° (apprx)	Ax pl b(010), Z ∧ c = 90° in obtuse ∠β	(G)
	$C_{18}H_{20}O_2$	Benzoyl-*p*-*tert.*-amyl phenol	R	Bi			58° 47′	Ax pl b(010); X∥a	(G)
5317	$C_{18}H_{21}O_3N$	Codeine	R	Bi.	+		125° (apprx)		(39)
5317	$C_{18}H_{21}O_3N\ H_2O$	Codeine		Bi.	–		130° (apprx)		(39)
5319	$C_{18}H_{21}O_3N$	Isocodeine	R	Bi	–			Ax. pl b(010); X∥c	(G)
5320	$C_{18}H_{21}O_3N$	Pseudocodeine	M	Bi	+			Ax pl. ⊥b(010); Z ∧ c = 22° in acute ∠β	(G)
	$C_{18}H_{24}O_8N_2$	Tetraethyl-*p*-diaminopyromellitate	M	Bi.		85°-90°		Ax pl. b(010)	(G)
5336	$C_{18}H_{27}O_3N$	Capsaicin		Bi.					(38)
	$C_{18}H_{29}O_3N$	Hydrocapsaicin		Bi					(38)
	$C_{18}H_{29}O_3N$	Vanillyl *n*-decoylamide	R	Bi	+		23° (calc.)		(34)
5343.1	$C_{18}H_{32}$	Fichtelite (Retene perhydride)	M	Bi.	–			Ax pl b(010), X∥a-axis	(G)
	$C_{18}H_{32}O_{16}\ 2H_2O$	Melezitose	R	Bi	–		85°	X = a, Y = b, Z = c	(36)
	$C_{19}H_{14}O_5$	Methyl pulvinate	M	Bi.	–			Ax. pl b(010); X∥c	(G)
	$C_{19}H_{15}O_4NS$	*ms*-Phenylacridonium hydrosulfate (green mod)	Tri	Bi.	-	42°			(G)
	$C_{19}H_{15}O_4NS$	*ms*-Phenylacridonium hydrosulfate (red mod)	M.	Bi.	+			Ax pl b(010); Z ∧ c = 78° 30′ in obtuse ∠β	(G)
5414	$C_{19}H_{17}N_3$	*α*-Triphenylguanidine	R	Bi	+		38° 3′	Ax. pl c(001); Z∥a	(G)
	$C_{19}H_{19}N_2I$	Phenyldiallylbenzimidazolium iodide	M.	Bi	+	85° 40.5′		Ax pl ⊥b(010); Z ∧ c = 38° 52′ in obtuse ∠β	(G)
5424	$C_{19}H_{19}O_4N$	Bulbocapnine	R	Bi	–			Ax. pl. a(100); X∥b	(G)
	$C_{19}H_{20}N_2$	Cinchene .. .	R	Bi			100° 56′	Ax. pl. c(001); Z∥b	(G)
	$C_{19}H_{20}ON_2$	Phenyldiallylbenzimidazolium hydroxide	M	Bi	+		60° 21′	Ax. pl. b(010); Z ⊥c(001)	(G)
5428 1	$C_{19}H_{20}ON_2$	Cinchoninone	R	Bi		65° 20′		Ax pl. c(001); Z∥b	(G)
	$C_{19}H_{21}N_2Cl\ 2H_2O$	Cinchonine chloride	R	Bi	+		13° (apprx)	Ax. pl. a(100); Z∥c	(G)
5441	$C_{19}H_{22}ON_2$	Cinchonidine .	R	Bi.	+		100° ± 10°	Z = b	(40)
	$C_{19}H_{22}ON_2\ C_6H_6$	Cinchonidine	R	Bi	+		Large		(40)
5442	$C_{19}H_{22}ON_2$	*α*-Cinchonine	M	Bi	–		38° ± 2°		(40)
5442	$C_{19}H_{22}ON_2$	*α*-Cinchonine	M	Bi	–		35° 52′	Ax pl. ⊥b(010); X ∧ c = 57° in obtuse ∠β	(G)
	$C_{19}H_{22}O$	*d*-Cinnamalidene camphor	R	Bi	+		28° (apprx)	Ax pl b(010), Z∥a	(G)
	$C_{19}H_{23}ON_2Br\ H_2O$	Cinchonine hydrobromide	R.	Bi.			150°		(G)
	$C_{19}H_{23}ON_2Br.\frac{1}{2}C_2H_6O$	Cinchonine hydrobromide	R	Bi.			155°		(G)
	$C_{19}H_{23}ON_2Br\ \frac{1}{2}(?)H_2O$	Cinchonidine hydrobromide	R	Bi.	+		140°	Ax pl a(100); Z∥c	(G)
	$C_{19}H_{23}ON_2Cl.2H_2O$	Cinchonine hydrochloride	M	Bi	–		102°	Ax pl ⊥b(010); X ∧ c = 35° in obtuse ∠β	(G)
	$C_{19}H_{23}ON_2Cl.\frac{1}{2}C_2H_6O$	Cinchonine hydrochloride	R	Bi	+		147°	Ax. pl. b(110); Z∥c	(G)
	$C_{19}H_{23}ON_2I.1.5CH_4O$	Cinchonine hydroiodide	R	Bi.	+		147° 40′	Ax. pl. c(001); Z∥b	(39)
	$C_{19}H_{23}O_3N.H_2O$	Codethyline	R	Bi	+		About 125°		(G)
	$C_{19}H_{24}O_5N_2S.5H_2O$	Cinchonidine sulfate	M.	Bi.	+		115° 36′	Ax pl ⊥b(010); Z ∧ c = 59° in obtuse ∠β	(G)

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	$C_{19}H_{24}O_{5}N_{2}Se \cdot 5H_2O$	Cinchonidine selenate	M.	Bi	+		156° 40′	Ax. pl. ⊥b(010); Z∧c = 59° in obtuse ∠β	(G)
5477	$C_{19}H_{28}O_2$	Abietic acid	M	Bi.	−		65°	Ax pl. b(010); X∧c = 13° in acute ∠β	(G)
	$C_{19}H_{29}O_3N$	Vanillyl undecenoylamide ..	R.	Bi	−		Very large		(24)
	$C_{19}H_{31}O_3N$	Vanillyl *n*-undecoylamide	Tri	Bi	+		110° (106° calc)		(24)
	$C_{20}H_{14}$	Benzal fluorene	R	Bi.	+		13°	Ax pl. a(100); Z∥c	(G)
	$C_{20}H_{16}O_4$	2, 4-Dihydroxytriphenylacetic acid	M	Bi	−	77° 18′		Ax pl ⊥b(010); X∧c = 7° in obtuse ∠β	(G)
	$C_{20}H_{17}O_3NS$	*α*-Naphylamine naphthalene-*α*-sulfonate		Bi					(1)
	$C_{20}H_{17}O_3NS$	*β*-Napthylamine naphthalene-*β*-sulfonate		Bi					(1)
	$C_{20}H_{17}O_3NS$	*α*-Napthylamine naphthalene-*β*-sulfonate		Bi					(1)
	$C_{20}H_{17}O_3NS$	*β*-Napthylamine naphthalene-*α*-sulfonate		Bi	+		85° 5′		(1)
	$C_{20}H_{18}O_6$	Pulvinic acid ethyl alcoholate	R	Bi		114°	61° 6′	Ax. pl. a(100); Z∥b	(G)
	$C_{19}H_{18}O_8$	Atranoric acid	R	Bi.	+			Ax pl. c(001); Z∥a	(G)
	$C_{20}H_{21}ON$	Benzoyl-*β*, *β*-diethylmethylindolenine	M	Bi	−		41° 25′	Ax. pl b(010); X∧c = 30° in acute ∠β	(G)
	$C_{20}H_{21}O_4N$	*d*(*l*)-Bulbocapnine methyl ether	Tet	Un					(G)
	$C_{20}H_{23}O_4N$	Corydin	Tet	Un					(G)
5561	$C_{20}H_{24}O_2N_2$	Quinidine	R	Bi	−		100° ± 10°		(40)
	$C_{20}H_{22}O_4N_4$	Diethyl dihydroxysuccinate γ osazone	R	Bi	+		143° 28′	Ax pl. a(100), Z∥b	(G)
	$C_{20}H_{24}O_2N_2 \cdot C_2H_6O$	Quinidine	R	Bi	+		80° ± 5°		(40)
	$C_{20}H_{24}O_2N_2 \cdot \frac{1}{2}C_6H_6$	Quinidine	R	Bi	+		85° ± 2°		(40)
5567	$C_{20}H_{24}O_2N_2$	Quinine	R (?)	Bi					(40)
	$C_{20}H_{24}O_2N_2 \cdot C_6H_6$	Quinine	R	Bi	+		Large		(40)
	$C_{20}H_{24}O_2N_2 \cdot C_6H_6$	Quinine (1 nst mod)	R	Bi	−		110° ± 10°		(40)
	$C_{20}H_{25}ON_2Br \cdot H_2O$	Bromomethylcinchonine	M	Bi			80° (apprx)	Ax. pl ⊥b(010)	(G)
	$C_{20}H_{26}O_6N_2S \cdot 7H_2O$	Quinine sulfate	R	Bi			19° 15′	Ax pl. a(100); X∥c	(G)
	$C_{20}H_{26}O_6N_2Se \cdot 7H_2O$	Quinine selenate	R	Bi	−		77° 15′	Ax pl. a(100), X∥c	(G)
	$C_{20}H_{27}O_2N_2Br$	Cinchonidine hydrobromide methyl alcoholate	R	Bi			142°		(G)
	$C_{20}H_{27}O_2N_2Br$	Cinchonine hydrobromide methyl alcoholate	R	Bi	+		40° 40′	Ax. pl. b(010); Z∥c	(G)
	$C_{20}H_{27}O_2N_2Cl$	Cinchonidine hydrochloride methyl alcoholate	R	Bi	+		140°	Ax. pl. a(100); Z∥c	(G)
	$C_{20}H_{27}O_2N_2Cl$	Cinchonine hydrochloride methyl alcoholate	R	Bi	+		157°	Ax. pl. b(010), Z∥c	(G)
	$C_{20}H_{27}O_2N_2I$	Cinchonine hydroiodide methyl alcoholate	R	Bi	+		126° 50′	Ax. pl. b(010); Z∥c	(G)
	$C_{20}H_{28}N_4$	Diethylaniline azyline	M	Bi					(G)
5588	$C_{20}H_{30}O_2$	*d*-Pimaric acid	R	Bi	+		76° 36′	Ax pl a(100); Z∥c	(G)
	$C_{20}H_{30}O_2$	*l*-Pimaric acid	R	Bi	+ (?)	61° 45′	110° 22′	Ax pl a(100), Z∥b	(G)
	$C_{20}H_{34}O_2$	Camphorpinacone	R	Bi			126° 50′	Ax pl a(100)	(G)
	$C_{20}H_{32}O_2N_2Cl_2$	*d*(*l*)-*α*-Limonene nitrosochloride	M	Bi	+		99° 34′- 100° 15′	Ax pl b(010); Z∧c = 4° 50′ in acute ∠β	(G)
	$C_{20}H_{33}O_3N$	Vanillyl *n*-dodecoylamide	M	Bi.	+		100° (calc)		(24)
	$C_{20}H_{31}O_3N$	Methylcapsaicin	M.	Bi					(24)
	$C_{21}H_{18}O_3$	Benzil benzilate	M.	Bi	−	74° 10′	149° 46′	Ax pl. b(010); X∧c = 104° in obtuse ∠β	(G)
	$C_{21}H_{19}N_2Br$	Amarine hydrobromide	Trig	Un					(G)
	$C_{21}H_{19}N_2Cl$	Amarine hydrochloride	Trig.	Un.					(G)
	$C_{21}H_{20}$	Diphenyl-*p*-xylylmethane	M	Bi.	+	57° 43′			(G)
	$C_{21}H_{21}O_2N_2Br$	*α*-Bromostrychnine	R.	Bi.	−		58°	Ax. pl a(100), X∥c	(G)
5642	$C_{21}H_{22}O_2N_2$	Strychnine	M. (?)	Bi					(37)
	$C_{21}H_{22}O_3N_2$	Tribenzylamine nitrate	R	Bi	−		45° 20′ (red)	Ax pl c(001), X∥a	(G)
5648	$C_{21}H_{23}O_5N$	Diacetylmorphine	R	Bi	−		110° (apprx)		(39)
	$C_{21}H_{24}O_7N_4$	*β*, *β*-Triethyl *α* methyleneindoline picrate	M	Bi	−		16° 7′		(G)
	$C_{21}H_{27}ON_2Br \cdot H_2O$	Cinchonine ethobromide	R	Bi		87° 50′		Ax pl. b(010), Z∥c	(G)
	$C_{21}H_{27}ON_3Cl_2$	Dichloromaleic-*p*-tolyl-dipiperidide	M	Bi	+		44° 40′	Ax pl b(010)	(G)
	$C_{21}H_{28}ON_2I_2 \cdot H_2O$	Cinchonidine hydroiodide ethiodide	M	Bi			90°	Ax pl ⊥b(010)	(G)
	$C_{21}H_{28}O_3N_2$	Quinidine methyl alcoholate	R	Bi	+		78°	Ax pl a(100); Z∥c	(G)
	$C_{21}H_{29}O_2N_2I$	Cinchonine hydroiodide ethyl alcoholate	R	Bi	−		19°	Ax. pl b(101); X∥c	(G)
	$C_{21}H_{36}O_2$	*d*-Bornyl methylene ether	R	Bi	+	75° 44′		Ax pl b(010), Z∥c	(G)
	$C_{22}H_{18}O_4$	*p*-Cresolphthalein	R	Bi	+	39°		Ax. pl. c(001); Z∥a	(G)
	$C_{22}H_{17}ON$	*α*, *β*-Dibenzoylcinnamenimide	R	Bi		82° 40′		Ax. pl b(010); Z∥a	(G)
	$C_{22}H_{17}O_5N$	Benzoyl benzohydroxamic anisate (*α*-mod)	M	Bi.	−		86° 30′		(G)
	$C_{22}H_{19}O_5N$	Anisoyl benzohydroxamic *p*-toluate (*β*-mod)	M	Bi	+	56° 24′	100° 44′	Ax pl. b(010)	(G)
	$C_{22}H_{20}N_2$	1, 3, 4-Triphenyltetrahydropyrazine	R	Bi	+	66° 4′		Ax pl a(100); Z∥c	(G)
	$C_{22}H_{22}O_2N_4$	Bisantipyrine	M	Bi		60° 52′	98° 4′	Ax pl b(010); Z∧c = 37° in obtuse ∠β	(G)
5704	$C_{22}H_{23}O_7N$	Narcotine	R.	Bi.	−		50° (apprx.)	Ax. pl. a(100); X∥c	(G)

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	$C_{22}H_{26}O_4$	Benzyl santoate	R	Bi	+	85° 57′ (red)		Ax pl. a(100); Z‖c	(G)
	$C_{22}H_{30}ON_2I_2.2H_2O$	Cinchonidine ethiodide methiodide	R	Bi		73° 30′		Ax pl. b(010); Z‖a	(G)
	$C_{22}H_{30}O_3N_2$	Quinidine ethyl alcoholate	R	Bi			78° 30′		(G)
	$C_{22}H_{38}O_2S_4$	Menthyl thioxanthic anhydride	R	Bi	-	85° 6′		Ax pl. b(010); X‖a	(G)
	$C_{23}H_{18}ONBr$	Bromomethyltriphenyl pyrrolone	M	Bi	+	70° 15′	122° 55′	Ax pl ⊥b(010); Z apprx ⊥a(10$\bar{1}$)	(G)
	$C_{22}H_{19}O_5N$	*p*-Toluyl anisohydroxamic benzoate (α-mod.)	M	Bi	+	64° 32.5′	120° 38′	Ax pl ⊥b(010); Z ∧ c = about 60° in obtuse ∠β	(G)
	$C_{22}H_{19}O_5N$	Anisoyl benzohydroxamic *p*-toluate (α-mod.)	M	Bi	+	78° 59′		Ax pl. ‖c(001); Z‖a	(G)
	$C_{22}H_{19}O_5N$	Anisoyl *p*-toluhydroxamic benzoate	M	Bi		84° 55′		X‖b	(G)
	$C_{22}H_{19}O_5N$	Benzoyl *p*-toluohydroxamic anisate	M	Bi		68° 32′	145°	Ax pl b(010), X ∧ c = 33° in obtuse ∠β	(G)
	$C_{22}H_{19}O_5N$	Benzoyl anisohydroxamic *p*-toluate	M	Bi	+	71° 12′		Ax pl b(010)	(G)
	$C_{22}H_{19}O_5N$	Benzoyl anisohydroxamic anisate	M	Bi			16° 42′	Ax pl ⊥b(010), Z ∧ c = 53° 50′ in obtuse ∠β	(G)
	$C_{23}H_{24}O_2N_4\ H_2O$	Methylene bisantipyrine	M	Bi		76° 30′		Ax pl b(010), Z ∧ c = 56° in obtuse ∠β	(G)
	$C_{23}H_{30}O_5NI\ H_2O$	Methyl trimethylcolchicinic methinate methiodide	R	Bi		72° (apprx.)		Ax pl a(100), Z‖b	(G)
5818	$C_{24}H_{18}$	1, 3, 5-Triphenylbenzene	R	Bi		9° 50′	18° 25′	Ax pl b(010), X‖c	(G)
	$C_{24}H_{21}ON$	Ethyltriphenylpyrrolone (β-mod.)	M	Bi			17° 20′	Ax pl ⊥b(010), X ∧ c = 63° in obtuse ∠β	(G)
	$C_{25}H_{23}ON$	Propyltriphenylpyrrolone (α-mod.)	R	Bi	+	65° 50′	135° 30′	Ax pl a(100); Z‖c	(G)
	$C_{25}H_{40}O_{10}$	Lepranthine	M	Bi				Ax pl b(010)	(G)
	$C_{26}H_{16}O$	Tetraphenylenepinacoline	M	Bi		80° (apprx.)		Ax pl b(010); X ∧ c = 50° (apprx.) in obtuse ∠β	(G)
	$C_{26}H_{23}O_5N$	*d*-Benzoylbulbocapnine	R	Bi		78° 34′	108° 58′	Ax pl c(001), X‖b	(G)
	$C_{26}H_{32}O_5N_2$	Strychnine ethyl carbonate	?	Bi	+		30° (apprx.)		(37)
	$C_{27}H_{30}O_4N_2$	Cinchonine phenylglycolate	R	Bi	+			Ax pl b(010), Z‖c	(G)
	$C_{27}H_{46}Br_2$	Cholestene dibromide (St. mod.)	R	Bi	+		45°	Ax pl a(100); Z‖c	(G)
	$C_{28}H_{20}O_4$	Stilbeneglycol dibenzoate	M	Bi	+	85° 58′		Ax pl. ⊥b(010), Z‖b	(G)
	$C_{28}H_{36}O_6N_2\ 3H_2O$	Brucine valerianate	M	Bi			86° (apprx.)	Ax pl ⊥b(010)	(G)
	$C_{28}H_{46}O_2$	Gurjun resin	Tri	Bi		86° 6′			(G)
5961	$C_{28}H_{46}O_2$	Cholesteryl formate	M	Bi	+			Ax pl b(010), Z ∧ c = 21° 30′	(G)
	$C_{30}H_{26}O_6N_2S_2$	α-Napthylamine naphthalene-1, 5-disulfonate		Bi					(1)
	$C_{30}H_{26}O_6N_2S_2$	α-Napthylamine naphthalene-1, 6-disulfonate	M.	Bi	–		Large		(1)
	$C_{30}H_{26}O_6N_2S_2$	α-Napthylamide naphthalene-2, 6-disulfonate		Bi.	-		Large		(1)
	$C_{30}H_{26}O_6N_2S_2$	α-Napthylamine naphthalene-2, 7-disulfonate		Bi	+				(1)
	$C_{30}H_{26}O_6N_2S_2$	β-Napthylamine naphthalene-1, 5-disulfonate (normal salt)		Bi	+		75° 5′ (obs.) 77° 6′ (calc.)		(1)
	$C_{30}H_{26}O_6N_2S_2$	β-Napthylamine naphthalene-1, 5-disulfonate (acid salt)		Bi			Large		(1)
	$C_{30}H_{26}O_6N_2S_2$	β-Napthylamine naphthalene-1, 6-disulfonate		Bi.	–		Large		(1)
	$C_{30}H_{26}O_6N_2S_2$	β-Napthylamine naphthalene-2, 6-disulfonate		Bi	+		70° 5′		(1)
	$C_{30}H_{26}O_6N_2S_2$	β-Napthylamine naphthalene-2, 7-disulfonate		Bi	-		Large	Bx_0 ⊥ plates	(1)
	$C_{30}H_{48}$	*d*-α-Amyrilene	R	Bi	+	72° 12′		Ax pl c(001), Z‖a	(G)
	$C_{30}H_{48}$	*d*-β-Amyrilene	R.	Bi	+	22° 21.5′	35° 26.5′	Ax pl c(001), Z‖b	(G)
	$C_{32}H_{26}O$	α-Isodypnopinacoline	R	Bi	+			Ax pl a(100), Z‖c	(G)
	$C_{32}H_{26}$	Tetraphenylethanebenzene	M	Bi			60° (apprx.)	Ax. pl ⊥b(010)	(G)
	$C_{32}H_{28}O_2$	Dypnopinacone	M	Bi			26° (apprx.)		(G)
	$C_{32}H_{32}O_{12}$	Tetrarin	Tri	Bi	–		33° (apprx.)	Ax pl. ⊥a(100)	(G)
6062 1	$C_{34}H_{40}O_{10}N_2S.7H_2O$	Morphine sulfate	R.	Bi	–		69° 37′ (red)	Ax. pl. b(010); X‖a	(G)
6067	$C_{34}H_{47}O_{11}N$	Aconitine	R.	Bi	+		56° 10′	Ax. pl. b(010); Z‖a	(G)
6075	$C_{34}H_{50}O_2$	Cholesterol benzoate	Tet.	Un					(G)
	$C_{40}H_{52}O_7N_4Se$	Cinchonine selenate ethyl alcoholate	M.	Bi.			77° 40′		(G)
	$C_{42}H_{38}O_4N_4S\ 3.5H_2O$	Amarine sulfate	M	Bi.	+		60° 57′	Ax. pl. ⊥b(010); Z ∧ c = 80° in obtuse ∠β	(G)
	$C_{42}H_{46}O_8N_4Se\ 5H_2O$	Strychnine selenate	M.	Bi.	+		14°	Ax pl. ⊥b(010); Z ∧ c = 34° in acute ∠β	(G)
	$C_{42}H_{46}O_8N_4S.5H_2O$	Strychnine sulfate	M.	Bi.	+		16° 30′	Ax. pl. ⊥b(010); Z ∧ c = 32° 43′ in obtuse ∠β	(G)
	$C_{52}H_{88}O_4$	Zeorine	H	Un					(G)

LITERATURE

(For a key to the periodicals see end of volume)

(*G*) Groth, *Chemische Krystallographie*, 3 vols 1906–1919 (*L-B*) Landolt-Börnstein-Roth-Scheel, *Physikalisch-Chemische Tabellen*, 5th Ed, 1923

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(10) Goldschmidt, *94*, **56**: 123, 15 (11) Gossner, *94*, **53**: 488, 14 (12) Hartley, Drugman *et al*, *4*, **108**: 751, 13 (13) Heilbron and Wilson, *4*, **101**: 1489, 12 (14) Hudson and Chernoff, *1*, **40**: 1007, 18 (15) Jaeger, *94P*, **18**: 49; 15 (16) Jameson and Wherry, *1*, **42**: 136, 20 (17) Jungfleisch, *34*, **166**: 801, 12 (18) Keenan, *O* (19) Kraggs, *1*, **123**: 77, 23

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X-RAY DIFFRACTION DATA FROM CRYSTALS AND LIQUIDS

R. W. G. Wyckoff

Introduction.—To find a given substance, consult Table 𝔄 for all elementary substances, 𝔅 for all chemical compounds, 𝔇 for all alloys which are not definite chemical compounds, 𝔗 for all liquids, and 𝔍 for solid solutions of salts

Except for the spacing observations given in Tables ℭ' and 𝔗, there are recorded below only such observations as can be made to yield dimensions for at least a possible unit cell. The structure types of some of the simpler unit cells are shown in Figs. 1–11. The mode of designating these structures and other coordinate groups giving atomic positions is that described in Wyckoff, "*The Structure of Crystals*," Chemical Catalog Co, New York, 1924.

ABBREVIATIONS

2*a*, 4*b*, 8*f*, (4*b*, 4*c*), (4*b*, 4*d*), (32*b*, 48*c*), etc. refer to the correspondingly numbered coordinate groups in Wyckoff, l c. and *Analytical Expression of the Results of the Theory of Space Groups* (Washington, 1922).

a_0, b_0, c_0	Edge length of unit cell along the *a*-, *b*-, and *c*-crystallographic axes, respectively.
α	The angle between the three equivalent axes of a rhombohedral unit, in a triclinic crystal, the angle between the *b*- and *c*-axes.
B.-c.	Body-centered type of structure. The cubic B.-c. arrangement (2*a*) is shown in Fig. 1.
β	Angle between the *a*- and *c*-axes
C.-p.	The hexagonal close-packed type of atomic arrangement (*d*) (*see* Fig. 3).
γ	Angle between the *a*- and *b*-axes in a triclinic crystal
2Ci	Holohedral symmetry class, monoclinic system. 2Ci-*m* (C_{2h}^m) as under T.
3Ci	Second sort hexagonal tetartohedral symmetry class, rhombohedral division, hexagonal system 3Ci-*m* (C_{3i}^m) and 3Ci-*m* (*n*) as under T.
4C	Tetartohedral symmetry class, tetragonal system. 4C-*m* (C_4^m) as under T.
6Ci	Paramorphic hemihedral symmetry class, hexagonal division, hexagonal system. 6Ci-*m* (C_{6h}^m) as under T.
Dia.	Diamond type (8*f*.) of atomic arrangement (see Fig. 4).
2D	Enantiomorphic hemihedral symmetry class, orthorhombic (rhombic) system. 2D-*m* (V^m), as under T.
2Di	Holohedral symmetry class, orthorhombic system. 2Di-*m* (V_h^m) and 2Di-*m* (*n*) as under T.
3D	Enantiomorphic hemihedral symmetry class, rhombohedral division, hexagonal system. 3D-*m* (D_3^m) and 3D-*m* (*n*) as under T.
3Di	Holohedral symmetry class, rhombohedral division, hexagonal system. 3Di-*m* (D_{3d}^m) and 3Di-*m* (*n*) as under T.
4d	Second sort hemihedral symmetry class, tetragonal system. 4d-*m* (V_d^m) and 4d-*m* (*n*) as under T.
4D	Enantiomorphic hemihedral symmetry class, tetragonal system. 4D-*m* (D_4^m) as under T.
4Di	Holohedral symmetry class, tetragonal system. 4Di-*m* (D_{4h}^m) and 4Di-*m* (*n*) as under T.
6Di	Holohedral symmetry class, hexagonal division, hexagonal system. 6Di-*m*(D_{6h}^m) and 6Di-*m* (*n*) as under T.
2e	Hemimorphic hemihedral symmetry class, orthorhombic system. 2e-*m* (C_{2v}^m) as under T.
3e	Hemimorphic hemihedral symmetry class, rhombohedral division, hexagonal system. 3e-*m* (C_{3v}^m) and 3e-*m* (*n*) as under 𝔗.
6e	Hemimorphic hemihedral symmetry class, hexagonal division, hexagonal system. 6e-*m* (C_{6v}^m) and 6e-*m* (*n*) as under T.
F.-c.	Face-centered type of structure. Cubic F.-c. arrangement (4*b*) shown in Fig. 2.
Oi	Holohedral symmetry class, cubic system. Oi-*m* (O_h^m) and Oi-*m* (*n*) as under T.
P. S.	Possible structure. Used to designate those atomic arrangements which may be correct but for which additional results are needed or desirable.
P. U. C.	Possible unit cell. Used to designate those crystals for which the selected unit cells may be correct but which require additional experimental or theoretical treatment.
S. P.	Sample compressed.
T	Tetartohedral symmetry class, cubic system. T-*m* = *m*th space group having this symmetry (= T^m). T-*m* (*n*) = *n*th atomic arrangement under T-*m*. For instance T-3(*c*) is seen by reference to Wyckoff (*Analytical expression*, p. 122), to be arrangement 8*a*. Similarly 4Di-7 (*c*) is the coordinate pair 0½u; ½00 (*ibid.*, p. 93).
Te	Hemimorphic hemihedral (tetrahedral) symmetry class, cubic system. Te-*m* (T_d^m) and Te-*m* (*n*) as under T.
Ti	Paramorphic hemihedral (pyritohedral) symmetry class, cubic system. Ti-*m* (T_h^m) and Ti-*m* (*n*) have meanings analogous to those of similar symbols under T.
u, or *v*	Variable *x*, *y* or *z* parameter.

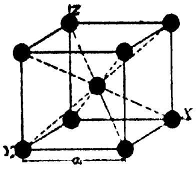

FIG. 1.—The unit cube of the body-centered cubic arrangement (2*a*). The coordinates of the atomic positions associated with this cell are 000; ½½½.

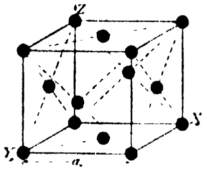

FIG. 2.—The unit cube of the face-centered cubic arrangement (4*b*) The coordinates of the atomic positions associated with this cell are 000, ½½0; ½0½; 0½½.

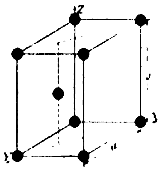

FIG. 3.—The unit cell of the hexagonal close-packed arrangement (*d*) The coordinates of the atomic positions associated with this cell are 000, ⅓ ⅔ ½.

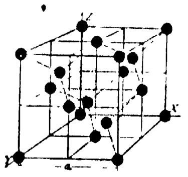

FIG. 4.—The unit cube of the diamond cubic arrangement (8*f*). The coordinates of the atomic positions associated with this cell are 000, ½½0; ½0½; 0½½; ¼¼¼; ¼¾¾; ¾¼¾, ¾¾¼

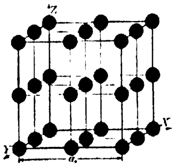

FIG. 5.—The unit cube of the NaCl-arrangement (4*b*, 4*c*) The atoms in positions 4*b* are shown as annuli; those in 4*c* as black circles The coordinates of 4*c* are 0½0; ½00; 00½; ½½½

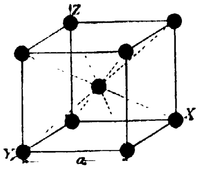

FIG. 6.—The unit cube of the CsCl-arrangement (1*a*, 1*b*). Atoms of one sort, in 1*a*, are shown as annuli; the other kind of atom, in 1*b*, appears as a black circle.

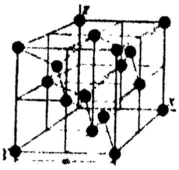

FIG. 7. The unit cube of the ZnS-arrangement (4*b*, 4*d*). The atoms in position 4*d* appear as black circles; their coordinates are ¼¼¼; ¼¾¾, ¾¼¾; ¾¾¼.

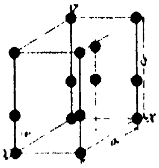

FIG. 8.—The unit cell of the ZnO-arrangement (*e*′). The coordinates of equivalent atomic positions are 000, ⅔ ⅓ ½ and 00*v*; ⅔, ⅓, *v* + ½.

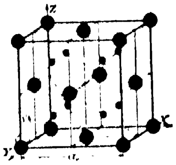

FIG. 9.—The unit cell of the CaF₂-arrangement (4*b*, 8*c*). The atoms in positions 8*c*, shown as black circles, have the coordinates ¼¼¼; ¼¾¾, ¾¼¾, ¾¾¼, ¾¾¾, ¼¼¾; ¾¼¼; ¼¾¼.

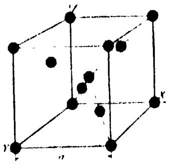

FIG. 10. The unit cube of the Cu₂O-arrangement (2*a*, 4*d*). The atoms in positions 4*d* are shown as annuli, those in 2*a* appear as black circles.

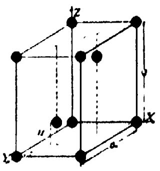

FIG. 11.—The unit cell of the hexagonal Mn(OH)₂ arrangement (*h*). The coordinates of the equivalent atomic positions in the unit are 000 and ⅓ ⅔*u*; ⅔ ⅓*u*.

λ-TABLE.—ELEMENTS

Chemical symbol	Crystal system	Structure type	Space group	Unit cell			Calculated density	Lit. and remarks
				Size, Å		Molecules		
				a_0	c_0			
A	C.	F.-c. (4*b*)		5.43		4	1.64$_5$	(**227**) (temp. *ca.* −253°)
Ag	C.	F.-c.(4*b*)		4.07$_9$		4	10.4$_9$	(**82, 142, 165, 218, 235, 240, 241, 265, 329, 371**)
Al	C.	F.-c.(4*b*)		4.04$_3$		4	2.69$_2$	(**84, 127, 128, 141, 197, 206, 216, 241, 329, 366, 361**)
As	H.	3Di-5(*c*)	3Di-5	4.14$_2$; 54° 7′		2	5.7$_5$	(**43, 366**) u. = 0.22$_6$, probably correct
Au	C.	F.-c.(4*b*)		4.06$_4$		4	19.$_4$	(**82, 84, 142, 165, 218, 241, 329, 371**)
Be	H.	C.-p (*d*)	6Di-4?	2.28$_3$	3.60$_7$	2	1.82$_8$	(**163**)
Bi*	H.	3Di-5(*c*)	3Di-5	4.72$_6$; 57° 16′		2	9.8$_6$	(**82, 118, 139, 140, 142, 166, 193**)
C-dia.	C.	Dia.(8*f*)	Oi-7	3.56		8	3.51	(**52, 59, 60, 128**)
Graph.†	H.	6e-4(*a*, *b*)	6e-4?	2.46	6.79	4	2.22	(**14, 88, 89, 105, 119, 128, 262, 310**)
Ca	C.	F.-c.(4*b*)		5.56		4	1.53$_8$	(**134, 135**)
Cd	H.	C.-p.(*d*)	6Di-4?	2.98	5.63	2	8.5$_6$	(**134, 136, 229**)
Ce	C.	F.-c.(4*b*)		5.12		4	6.9$_0$	(**137**)
	H.	C.-p (*d*)	6Di-4?	3.65	5.96	2	6.7$_3$	(**137**). Existence (?) (**224**)
Co	C.	F.-c (4*b*)		3.55$_4$		4	8.6$_7$	(**131, 136**), *cf.* (**224**)
	H.	C.-p (*d*)	6Di-4?	2.51$_4$	4.10$_5$	2	8.6$_6$	(**131, 136**), *cf.* (**224**)
Cr	C.	B.-c (2*a*)		2.87$_5$		2	7.2$_2$	(**131, 136, 201, 206**)
Cu	C.	F.-c.(4*b*)		3.60$_3$		4	8.9$_5$	(**46, 82, 84, 141, 145, 196, 197, 198, 199, 200, 329, 374, 371**)
Fe-α	C.	B.-c (2*a*)		2.85$_5$		2	7.9$_2$	(**82, 84, 122, 128, 131, 168, 196, 250, 253, 254, 255, 256, 362**)
Fe-β	C.	B.-c (2*a*)		2.90 at 800°		2	7.5$_5$	
Fe-γ	C.	F.-c (4*b*)		3.63 at 1100° 3.68 at 1425°		4	7.7$_0$ at 1100° 7.4$_0$ at 1425°	No structural inversion, α to β (**250, 253, 254, 255, 256, 257**)
Fe-δ	C.	B.-c (2*a*)		2.93 at 1425°		2	7.3$_3$	
Ga		Symmetry said to be not cubic						(**285**)
Ge	C.	Dia (8*f*)	Oi-7	5.62		8	5.3$_8$	(**14, 138**)
Hf	H.	C.-p (*d*)	6Di-4?	3.32	5.46	2	11.$_3$	(**324, 379**)
Hg		Two different structures have been deduced						(**2, 170**)
In	Tet.?	?		4.58	4.86	4	7.4$_3$	(**134, 136**) P. U. C.
Ir	C.	F.-c (4*b*)		3.82$_3$		4	22.$_8$	(**134, 136, 284**)
K	C.	B.-c.(2*a*)		5.20 at −150°		2	0.91$_7$ at −150°	(**162**). Approximate only
Li	C.	B.-c (2*a*)		3.50		2	0.53$_4$	(**32, 33, 128**)
Mg	H.	C.-p.(*d*)	6Di-4?	3.22	5.23	2	1.70$_9$	(**36, 128, 129, 196**)
Mn (α)	C.?			8.89		56?	7.2$_1$	(**350**) P. U. C.
Mn (β)	C.?			6.28$_9$		20?	7.2$_9$	(**350**) P. U. C.
Mn (γ)	Tet.?			3.77$_4$	3.53$_3$	4	7.2$_1$	(**350, 368**) P. U. C.
Mo	C.	B.-c.(2*a*)		3.14$_3$		2	10.2$_0$	(**82, 136, 236, 329**)
Na	C.	B.-c.(2*a*)		4.30		2	0.95$_4$	(**128**)
Nb	C.?			4.19		4		(**366**) P. U. C. Impure
Ni	C.	F.-c.(4*b*)		3.49$_9$		4	9.04	(**36, 82, 84, 128, 131, 136, 168, 206, 260, 299, 329, 360, 361**)
Os	H.	C.-p.(*d*)		2.71$_4$	4.32	2	22.$_8$	(**137**)
P (black)	H.			5.96; 60° 16′		8		(**392**) P. S. like As
Pb	C.	F.-c.(4*b*)		4.92$_0$		4	11.4$_8$	(**82, 84, 156, 196, 206, 241, 329, 340**)
Pd	C.	F.-c.(4*b*)		3.85$_9$		4	12.25	(**134, 136, 164, 167, 329, 393**)
Pt	C.	F.-c.(4*b*)		3.91$_3$		4	21.5	(**82, 134, 136, 142, 329, 393**)
Rh	C.	F.-c.(4*b*)		3.82$_0$		4	12.2	(**136, 393**)
Ru	H.	C.-p.(*d*)	6Di-4?	2.68$_6$	4.27$_2$	2	12.$_6$	(**134, 136**)
S	R.		2Di-24	10.61	24.56	128	2.02	(**61, 314**) b_0 = 12.87
Sb	H.	3Di-5(*c*)	3Di-5	4.50$_0$; 56° 37′		2	6.7$_3$	(**140, 193**) u. = 0.23$_1$
Se	H.	3D-4(*a*) (or 3D-6(*a*))	3D-4 or 3D-6	4.34	4.95	3	4.8$_6$	(**42, 232, 308, 366**) u. = 0.21$_6$. P. S.
Si	C.	Dia.(8*f*)	Oi-7	5.42		8	2.32	(**88, 107, 108, 127, 128, 153, 154**)
Sn (gray)	C.	Dia.(8*f*)	Oi-7	6.46		8	5.8$_1$	(**29, 30, 31**), *cf.* (**206**)
(white)	Tet.	4Di-19(*a*)	4Di-19?	5.82$_4$	3.16$_5$	4	7.3$_0$	(**29, 30, 31, 172, 173, 174, 206, 238**)
Ta	C.	B.-c.(2*a*)		3.27$_2$		2	17.$_1$	(**25, 134, 136**)

Chemical symbol	Crystal system	Structure type	Space group	Unit cell			Calculated density	Lit. and remarks
				Size Å a_0	c_0	Molecules		
Te	H.	3D-4(*a*) or 3D-6(*a*)	3D-4 or 3D-6	4.44	5.90	3	6.2_6	(42, 232, 308, 366) $u = 0.26_9$. P. S.
Th	C.	F.-c.(4*b*)		5.0_4		4	12.0	(36, 137)
Ti	H.	C.-p.(*d*)	6Di-4?	2.92	4.67	2	4.5_8	(36, 137, 201)
Tl	H.?	C.-p.(*d*)?	6Di-4(?)	3.47	5.52	2	11.7	(25, 156). Correct unit uncertain
	Tet.(?)			4.75	5.40			
U				Said to be not cubic				(25)
V	C.	B.-c.(2*a*)		3.04		2	5.9_8	(138)
W	C.	B.-c.(2*a*)		3.15_5		2	19.3	(67, 82, 84, 87, 136, 374)
Zn	H.	C.-p.(*d*)	6Di-4?	2.65_7	4.94_8	2	7.0_4	(134, 136, 206, 229, 346)
Zr	H.	C.-p.(*d*)	6Di-4?	3.23	5.14	2	6.47	(137, 379)

* $u = 0.23_7$. (142, 61 early editions) give incorrect structures

† u for 6c-4 (a) = 0. u for 6c-4 (b) = $\frac{1}{14}$

𝔅-TABLE.—STANDARD ARRANGEMENT v. p. 96

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å a_0	c_0	M	Calculated density	Lit	Additional data and remarks
H_2O	H			4.52	7.32	4	0.91_8	(54, 90, 114, 210, 213)	P. U. C. Atomic arrangement not yet known with certainty.
HCl	C	F.-c.?		5.5_0, −168°C		4	1.45	(228)	
11 N_2O	C	(4*f*)	T-4	5.77		4	1.51	(232, 288)	$u_0 = 0.22_8$, distance O-N = 1.06Å P. S.
NH_3	C	[4*f*, T-4(*b*)]	T-4	5.19(*ca.* 80°)		4	0.81	(338)	$u = 0.22$
NH_4Cl (high)	C	NaCl-like		6.53(250°)		4	1.27	(20)	
NH_4Cl (low)	C	CsCl-like		3.86_8		1	1.52_8	(20, 120, 244, 280)	
$N_2H_6Cl_2$	C.	FeS_2-like (8*h*, 8*h*)	Th-6	7.89		4	1.41	(281)	$u_N = ca.\ 0.04$, $u_{Cl} = 0.27$
NH_4Br (high)	C	NaCl-like		6.90(250°)		4	1.97	(20)	
NH_4Br (low)	C	CsCl-like		4.04_7		1	2.43_8	(20, 120, 244)	
NH_4I	C.	NaCl-like		7.24_4		4	2.51_7	(20, 120, 243)	
$(NH_4)_2SO_4$	R.		2Dh-16	5.95	7.73	4	1.80	(155)	$b_0 = 10.5_6$
12 PH_4I	Tet.	4Dh-7(*a*, *c*)	4Dh-7	6.34	4.62	2	2.88	(94)	$u_I = 0.40 \pm 0.01$
$(NH_4)H_2PO_4$	Tet.		4d-12	7.48	7.55	4	1.80	(342)	N atoms at 4d.-12(*a*); P at 4d-12 (*b*)
As_2O_3	C.	(32*b*, 48*c*)	Oh-7	11.06		16	3.86	(41)	$u_{As} = 0.89_5$, $v_O = 0.21$
Sb_2O_3	C.	(32*b*, 48*c*)	Oh-7	11.14		16	5.5_7	(41)	$u_{Sb} = 0.88_8$, $v_O = 0.23$
16 CO_2	C	(4*b*, 8*h*)	Th-6	5.62		4	1.64	(317, 318, 358, 382)	u_O uncertain. Liquid air-temperature

For other carbon compounds belonging here *v.* the ℭ-Table *infra*

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å a_0	c_0	M	Calculated density	Lit	Additional data and remarks
SiO_2 (β-quartz)	H.	6D-4 6D-5 } (*c*, *j*)	6D-4 & 6D-5	5.01	5.47	3	2.50	(331, 332, 339)	$u = 0.19_7$
SiO_2 (low quartz)	H		3D-3 & 3D-5 or 3D-4 & 3D-6	4.903	5.39_8	3	2.64_8	(21, 48, 169, 227, 331)	P. U. C. a_0-spacing for quartz very accurately determined.
SiO_2 (β-cristobalite)	C.	(8*f*, 16*b*)	Oh-7?	7.12(290°)		8	2.20	(288, 377, 380)	
$(NH_4)_2SiF_6$	C	(4*b*, 8*c*, 24*a*)	Oh-5	8.38		4	2.00	(28)	$u_F = 0.205$
SiC, I	H.			3.09_5	37.9	15	3.15	(283)	Complex structure assigned
SiC, II	H.		6C-6?	3.09_5	15.17	6	3.15	(347, 348)	C at 6C-6(*a*) if *u* = 0 and 6C-6-(*b*), if *u* = ⅙ and ⅚. Si at 6C-6(*a*) if *u′* = ⅛ and 6C-6(*b*) if *u′* = 0.29 and 0.95 P. S.
SiC, III	H.			3.09_6	10.10	4	3.16	(390)	C at 000; 00½; ⅓ ⅔ ¼; ⅔ ⅓ ¾. Si at 00*u*; 0, 0, *u* + ½; ⅓, ⅔, *u* + ¼; ⅔, ⅓, *u* + ¾, *u* = *ca.* $\frac{3}{16}$. P. S.
TiO_2 (rutile)	Tet.	4Dh-14(*a*, *f*)	4Dh-14	4.58	2.98	2	4.21	(83, 113, 241, 263)	
TiO_2 (anatase)	Tet.			5.27	9.37	8	4.05	(243)	P. U. C.
Ti_2O_3	H.	3Dh-6(*c*, *e*)	3Dh-6	5.37, 56° 48′		2	4.67	(351)	
TiN	C.	NaCl(4*b*, 4*c*)		4.23?		4	5.4_0?	(13, 306)	The later determination gives $a_0 = 4.40$
TiC	C.	NaCl(4*b*, 4*c*)		4.29?		4	5.0_1?	(13, 306)	The later determination gives $a_0 = 4.6_0$
21 ZrO_2	C.	CaF_2(4*b*, 8*e*)	Oh-5	5.08		4	6.1_9	(13)	P. S. Other data (83) conflict. 2 modifications?
ZrS_2	H.	$Mn(OH)_2$(*h*)	3Dh-3	3.68	5.85	1	3.73	(13)	P. S. *u* = *ca* 0.25
$ZrSe_2$	H.	$Mn(OH)_2$(*h*)	3Dh-3	3.79	6.18	1	5.3_6	(13)	P. S. *u* = *ca.* 0.25
ZrN	C	NaCl(4*b*, 4*c*)		4.61		4	7.1	(13, 306)	P. S.
$(NH_4)_3ZrF_7$	C.	(4*d*, 4*e*, 12*a*, 24*u*)	Oh-4	9.35		4	2.2_5	(13)	$0.15 < u_N < 0.21$; $0.42 < u_F < 0.48$, $0.23 < v_F < 0.28$
ZrC	C.	NaCl(4*b*, 4*c*)		4.7_8		4	6.4	(13, 306)	P. S.
$ZrSiO_4$	Tet.			9.20	5.87	8	4.85	(241)	P. U. C.

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
SnO	Tet.	4Dh-7(*a, c*)?		3 77	4 77	2	6 56	(300)	
SnO_2	Tet			4 72	3 16	2	7 07	(83, 241, 383)	
SnI_4	C.	Th-6(*c, d*)	Th-6	12 23		8	4 52	(96, 175)	P. U. C. $u_{Sn} = 0.129$, $u_I = 0.253$, $x = 0.009$, $y = 0.001$, $z = 0.253$
$(NH_4)_2SnCl_6$	C.	(4*b*, 8*c*, 24*a*)	Oh-5	10 05		4	2 39	(92)	$u_{Cl} = 0.248$ and < 0.25
22 PbO	Tet	4Dh-7(*a, c*)		3 99	5 01	2	9 28	(97, 300)	u_{Pb}[4Dh-7(*c*)] = 0.24
PbO_2	Tet.	4Dh-14(*a, f*)	4Dh-14	4 97	3 40	2	9 40	(345, 388)	
$PbF_2(\beta)$	C.	CaF_2(4*b*, 8*c*)	Oh-5	5 93		4	7 76	(340)	
PbS	C	NaCl(4*b*, 4*c*)		5 97		4	7 42	(61, 76, 154, 340, 357)	
PbSe	C.	NaCl(4*b*, 4*c*)		6 14		4	8 17	(357, 366)	
PbTe	C	NaCl(4*b*, 4*c*)		6 34		4	8 67	(357)	
$Pb(NO_3)_2$	C.	(4*b*, 8*h*, Th-6(24))	Th-6	7 84		4	4 54	(101, 245)	
ThO_2	C.	CaF_2(4*b*, 8*c*)	Oh-5	5 59		4	9 98	(13, 83, 111)	Another determination of a_0 (289) varies widely from this.
Ga_2O_3	H.	3Dd-6(*c, e*)	3Dd-6	5 281, 55° 35′		2	6 62	(351)	
In_2O_3	C		Oh-10	10 12		16	7 07	(351)	
$(Ga, In)_2O_3$	C.		Oh-10	9 76		16		(351)	39 mol. % In_2O_3
Tl_2O_3	C		Oh-10	10 57		16	10 2	(351)	
TlCl	C	CsCl(1*a*, 1*b*)	Oh-1	3 84		1	6 92	(85, 239, 369)	
TlBr	C	CsCl(1*a*, 1*b*)	Oh-1	3 97		1	7 44	(239, 369)	
ZnO	H	ZnO(*e′*)	6e-4	3 25	5 23	2	5 61	(4, 7, 51, 61, 121, 249)	
$Zn(BrO_3)_2.6H_2O$	C	(4*b*, 8*h*, Th-6(24))	Th-6	10 31		4	2 59	(278)	
α-ZnS (wurtzite)	H.	ZnO(*e′*)	6e-4	3 84	6 28	2	4 01	(9, 51, 381)	$u_S = ca.\frac{3}{8}$
β-ZnS (blende)	C.	ZnS(4*b*, 4*d*)	Td-2	5 43		4	4 02	(47, 103, 108, 154)	
ZnSe	C	ZnS(4*b*, 4*d*)	Td-2	5 65		4	5 29	(80)	
$ZnCO_3$	H.	3Dd-6(*a, b, e*)	3Dd-6	5 62, 48° 23′		2	4 54	(160)	
29 CdO	C	NaCl(4*b*, 4*c*)		4 72		4	8 06	(86, 217)	
CdF_2	C	CaF_2(4*b*, 8*c*)	Oh-5	5 40		4	6 30	(340)	
CdI_2	H.	$Mn(OH)_2$(*h*)	3Dd-3	4 24	6 84	1	5 67	(29)	$0.23 < u_I < 0.253$
α-CdS	H	ZnO(*e′*)	6e-4	4 14	6 72		4 78	(51, 381)	$u_S = ca\ \frac{3}{8}$
β-CdS	C	ZnS(4*b*, 4*d*)	Td-2	5 82		4	4 84	(381)	
Hg_2Cl_2	Tet	4Dh-17(*e*)		4 47	10 89	2	7 16	(344)	$u_{Hg} = \frac{1}{9}$, $u_{Cl} = \frac{1}{3}$ P. S.
Hg_2Br_2	Tet	4Dh-17(*e*)		4 65	11 10	2	7 71	(344)	$u_{Hg} = \frac{1}{9}$, $u_{Br} = \frac{1}{3}$ P. S.
HgI_2	Tet			4.356	12.34	2	6.40	(397)	
Hg_2I_2	Tet.	4Dh-17(*e*)		4 92	11 61	2	7 68	(344)	$u_{Hg} = \frac{1}{9}$, $u_I = \frac{1}{3}$ P. S.
HgS (metacinnabarite)	C.	ZnS(4*b*, 4*d*)	Td-2	5 84		4	7 71	(150, 151, 154, 336, 337, 365, 366)	
HgS (cinnabar)	H		3D-4 & 3D-6	4 16	9 54	3	8 12	(150, 357, 365, 366)	P S suggested
CuO	Tri			3 74	4 67	4	6 48	(188)	P S This suggested structure resembles NaCl. $b_0 = c_0$ $\alpha = 85° 21′$, $\beta = 86° 25′$; $\gamma = 93° 35′$
Cu_2O	C	Cu_2O(2*a*, 4*d*)	Oh-4	4 28		2	6 02	(61, 113, 188)	
CuCl	C	ZnS(4*b*, 4*d*)	Td-2	5 40		4	4 15	(76, 293)	
CuBr	C	ZnS(4*b*, 4*d*)	Td-2	5 78		4	4 98	(76, 293)	
CuI	C	ZnS(4*b*, 4*d*)	Td-2	6 07		4	5 62	(8, 76, 293)	
Cu_2Se	C.	CaF_2(4*b*, 8*c*)	Oh-5	5 75		4	7 18	(80)	
Cu_5Zn_8	C.			4 01				(34) *cf* (197)	Correctness in doubt
32 Ag_2O	C.	Cu_2O(2*a*, 4*d*)	Oh-4	4 72		2	7 27	(76, 88, 161, 277)	
AgCl	C.	NaCl(4*b*, 4*c*)		5 54		4	5 56	(76, 264, 265)	
AgBr	C.	NaCl(4*b*, 4*c*)		5 77		4	6 45	(76, 264, 265)	
AgI	H.	ZnO(*e′*)	6e-4	4 59	7 50	2	5 68	(6, 8, 265)	
AgI	C.	ZnS (4*b*, 4*d*)	Td-2	6 49		4	5 67	(76, 264, 265)	
Ag_3PO_4	C.	(2*a*, 6*f*, 8*a*)	Td-4	6 00		2	6 37	(267)	
Ag_3AsO_4	C	(2*a*, 6*f*, 8*a*)	Td-4	6 12		2	6 66	(267)	
(4AgI:CuI) miersite	C.	ZnS(4*b*, 4*d*)	Td-2	6 35		4		(8)	A solid solution of AgI and CuI. Exact composition unknown
$(NH_4)_2PtCl_6$	C	(4*b*, 8*c*, 24*a*)	Oh-5	9 84		4	3 08	(292)	$0.22 < u_{Cl} < 0.24$
$PtAs_2$ (sperrylite)	C.	FeS_2(4*b*, 8*h*)	Th-6	5 94		4		(387)	Composition unknown
$(NH_4)_2PdCl_4$	Tet	4Dh-1(*a, e, j*)	4Dh-1	7 21	4 26	1	2 12	(95)	$u_{Cl} = 0.23$
MnO	C.	NaCl(4*b*, 4*c*)		4 40		4	5 50	(187)	
MnO_2	Tet.			4 44	2 89	2	5 04	(214)	Pyrolusite gives the same pattern as polianite
$Mn(OH)_2$	H	$Mn(OH)_2$(*h*)	3Dd-3	3 34	4 68	1		(3)	Dimensions of this unit calculated from the density $\rho = 3.26$. $u_0 = ca. 0.22$
MnS	C.	NaCl(4*b*, 4*c*)		5 21		4	4 06	(272)	
MnS_2	C.	FeS_2(4*b*, 8*h*)	Th-6	6 15		4		(104, 106)	$u_s = 0.40_9$. Size of unit cell calculated from the best available density, [$\rho = 3.38$(162)]
$MnCO_3$	H.	3Dd-6(*a, b, e*)	3Dd-6	5 84, 47° 45′		2	3 79	(47, 270)	C atoms at (*a*); $u_0 = 0.27$
43 FeO	C	NaCl(4*b*, 4*c*)		4 294		4	5 99	(322)	
Fe_2O_3	H.	3Dd-6(*c, e*)	3Dd-6	5 42; 55° 17′		2	5 28	(61, 81, 181, 205, 381)	$u_{Fe} = 0.105 \pm 0.001$: $u_0 = 0.292 \pm 0.007$
Fe_3O_4	C	(8*f*, 16*c*, 32*b*)	Oh-7	8 37		8	5 21	(50, 121, 189, 394)	$u_0 = ca. 0.37$
FeS (troilite)	H.	6e-4(*a, b*)		3 43	5 79	2	4 90	(386, 391)	If $u_{Fe} = 0$, $u_S = ca.\frac{1}{4}$. If $u = \frac{1}{4}$ exactly, the space group is 6Dh-4

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
FeS_2 (pyrite)	C.	FeS_2(4b, 8h)	T_i-6	5 38		4	5 0$_8$	(47, 104, 106, 287)	$u_S = 0.38_8$
$FeS + S_x$	H.	6e-4(a, b)		3 43	5 68	2		(356, 391)	Artificial and natural pyrrhotites containing excess sulfur
FeSe	H.	6e-4(a, b)		3 61	5 87	2		(356)	39.4% Fe (weight)
$FeSe + Se_x$	H.	6e-4(a, b)		3 51	5 55	2		(356)	35 0% Fe (weight)
Fe(S, Se)	H.	6e-4(a, b)		3 54	5 91	2		(356)	49.8% (weight) Fe, 12 0% S, 38.2% Se
$(NH_4)_3FeF_6$	C.	(4b, 4c, 8e, 24a)	O_i-5	9 10		4	1 96	(203)	N atoms at (4c) and (8e). 0.187 < u_F < 0.217, best around 0.21
$NH_4Fe(SO_4)_2.12H_2O$	C	(4b, 4c, 8h, 8h, T_i-6 (24))	T_i-6	12 14		4	1 81	(248)	
Fe_3C	R.			4 52	6 74	4	7 6$_7$	(5, 6, 7, 284, 261)	Cementite and cohenite are identical in structure. Atomic arrangement unknown. $b_0 = 5.07$
$FeCO_3$	H.	3D_i-6(a, b, e)	3D_i-6	5 82, 47° 45′		2	3 86	(47, 270)	C atoms at (e): $u_0 = 0.27$ probably
FeSi	C.			4 48		4	6 1$_8$	(207)	Probably tetartohedral; atomic arrangement unknown
$FeSi_2$	Tet.			2 69	5 08	1	5 0$_2$	(207)	P. U. C., structure unknown
$FeCuS_2$	Tet	4d-5(c, a, g)?	4d-5 ?	5 23	5 15	2		(65, 118)	Fe atoms at (c). u_0 = ca. 0.21. Probably correct structure.
CoO	C.	NaCl(4b, 4c)		4 24		4	6 4$_9$	(351)	
CoS	H.	6e-4(a, b)		3 37	5 14	2	5 9$_4$	(356)	
CoAsS	C.	FeS_2-like(4f)	T-4	5 65		4	6 07	(183, 387)	Reflection microscopic results (161) suggest that this structure may not be correct
(Fe, Co)S (synthetic)	H.	6e-4(a, b)		3 36	5 29	2		(356)	Composition = ca. 50 atomic % FeS
45 NiO	C.	NaCl(4b, 4c)		4 17$_2$		4	6 7$_5$	(74, 86, 299, 351, 353, 360)	
NiS (synthetic)	H.	6e-4(a, b)		3 42	5 30	2	5 5$_8$	(356)	u_S = ca. ¼ taking $u_{Ni} = 0$
NiS (millerite)	H.	3e-5(b, b)	3c-5	5 64, 116° 36′		3		(386)	Possible atomic positions are suggested
Ni_3S_2	C ?			4 08		1		(356)	P. U. C.
NiSe	H	6e-4(a, b)		3 66	5 33	2		(356)	
$Ni(NO_3)_2.6NH_3$	C.	(4b, 8h, T_i-6(24))	T_i-6	10 9$_8$		4	1 43	(278)	u_N in (8h) = ca. ¼, y_N and z_N = ca. 0, z_0 and y_0 = ca. ¼.
$NiCl_2.6NH_3$	C.	(4b, 8e, 24a)	O_i-5	10 0$_9$		4	1 49	(274)	$u_N = 0.24$
$NiBr_2.6NH_3$	C.	(4b, 8e, 24a)	O_i-5	10 4$_8$		4	1 84	(274)	
$NiI_2.6NH_3$	C.	(4b, 8e, 24a)	O_i-5	11 01		4	2 05	(274)	$u_N = 0.24$
NiAs	H.	6e-4(a, b)		3 61	5 03	2		(9, 356, 391)	Niccolite from Eisleben.
NiAsS (gersdorffite)	C.	FeS_2-like(4f)	T-4	5 68		4		(357, 366)	
NiSb	H.	6e-4(a, b)		3 92	5 11	2	8 7$_3$	(356, 391)	For the mineral breithauptite from Andreasberg $a_0 = 3.90$, $c_0 = 5.09$
NiSbS (ullmanite)	C.	FeS_2-like(4f)	T-4	5 91		4		(387)	Composition unknown
(Ni, Fe)S (synthetic)	H.	6e-4(a, b)		3 40$_8$	5 54$_0$	2		(356)	S = 37.8%, Fe = 33.9%, Ni = 28.3% (weight)
(Ni, Fe)S (synthetic)	H.	6e-4(a, b)		3 40$_8$	5 43$_4$	2		(356)	S = 38.4%, Fe = 28 7%, Ni = 32.8% (weight)
(Ni, Fe)S (pentlandite)	C.		O_i-5 ?	10 0$_0$		32		(356)	(8f, 24a, 32a) with $u_{Fe}(24a)$ = ca. ¼ and u_S = ca. ⅛ gives fair agreement. Various compositions
Cr_2O_3	H.	3D_i-6(c, e)	3D_i-6	5 3$_8$; 54° 58′		2	5 2$_8$	(351)	
MoS_2	H	6D_i-4(c, f)	6D_i-4	3 15	12 30	2	5 00	(99, 311)	$u_S = 0.62_1$
$(NH_4)_3MoO_3F_3$	C.	(4b, 4c, 8e, 24a)	O_i-5 ?	9 10		4	2 23	(203)	N atoms at (4c) and (8e). F + O at (24a). 0.194 < $u_{F,O}$ < 0.220
$PbMoO_4$	Tet.			3 85	6 02	1		(91)	P. U. C.
Ag_2MoO_4	C.	(8f, 16c, 32b)	O_i-7	9 26		8	6 2$_5$	(276)	0.34 < u_O < 0.40
49 UO_2	C.	CaF_2(4b, 8e)	O_i-5	5 47		4	10 8$_9$	(13, 111)	
$UO_2(NO_3)_2.6H_2O$	R.		2D_i-17	13 15	11 42	4	2 75	(66, 204)	U atoms probably at 2D_i-17 (c) with u = 0.13. $b_0 = 8.02$
V_2O_3	H.	3D_i-6(c, e)	3D_i-6	5 43, 53° 53′		2	5 0$_9$	(351)	
VN	C.	NaCl(4b, 4c)		4 28		4	5 4$_7$	(306)	
VC	C.	NaCl(4b, 4c)		4 30		4	5 2$_3$	(306)	
CbN	C.	NaCl(4b, 4c)		4 41		4	8 2$_5$	(306)	
CbC	C.	NaCl(4b, 4c)		4 40		4	8 1$_4$	(306)	
TaN	H.	ZnO(e′)	6e-4	3 05	4 94	2	16 2	(13)	P. S. Cf. (307) which gives conflicting results
TaC	C.	NaCl(4b, 4c)		4 5$_3$		4	13 7	(13, 306)	
B_2H_6	H.			4 54	8 69	2	0 58$_9$	(349)	B atoms probably at 6D_i-4 (f) with u = ca. 0.10. Temperature not stated
55 Al_2O_3	H.	3D_i-6(c, e)	3D_i-6	5 12, 55° 17′		2	3 96	(61, 81, 181, 205, 351)	The α-form. $u_{Al} = 0.105 \pm 0.001$; $u_O = 0.303 \pm 0.003$

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
AlN	H.	ZnO(e')	6e-4	3.11	4.98	2	3.24	(195)	$u = 0.38 \pm 0.01$
$(NH_4)_3AlF_6$	C	(4b, 4c, 8e, 24a)	O_h-5	8.40		4	2.17	(203)	N atoms at (4c) and (8e). $0.194 < u_p < 0.200$
$NH_4Al(SO_4)_2.12H_2O$	C.	(4b, 4c, 8h, 8h, T_h-6 (24))	T_h-6	12.0_0		4	1.76	(248, 282)	
AlSb	C.	ZnS(4b, 4d)	T_d-2	6.13		4	4.26	(298)	
$Al_2F_2(SiO_4)$ topas	R		$2D_h$-16	4.64	8.37	4		(158	Topas from San Luis Potosi, Mexico; $b_0 = 8.78$
CuAl	H	F.-c.?		3.89, 94° 36'		4		(141, 197, 258)	This structure may be incorrect
Cu_3Al	C.	F.-c.		3.47		4		(24) cf. (141)	Probably incorrect
$CuAl_2$	Tet.	B.-c.		6.05	4.88	4	4.35	(141, 197, 258)	Atomic arrangement unknown
$(Fe'', Mn'')_3\ Al_2(SiO_4)_3$ (garnet)	C.		O_h-10	11.4_0		8		(190)	67 atomic % of ferrous iron
NiAl	C.	CsCl(1a, 1b)?		2.82		1	6.2_8	(24)	More work needed
56 Sc_2O_3	C		O_h-10	9.79		16	3.89	(351)	
ScN	C	NaCl(4b, 4c)		4.44		4	4.4_6	(306)	
$(Sc, In)_2O_3$	C		O_h-10	9.90		16		(351)	66.8 mol. % Sc_2O_3
$(Al, Sc)_2O_3$	C		O_h-10	9.22		16		(351)	Composition unknown
Yt_2O_3	C		O_h-10	10.56		16	5.0_7	(351)	
$YtPO_4$	Tet.			9.60	5.94	8	4.44	(242)	P. U. C.
$(Yt, Tl)_2O_3$	C.		O_h-10	10.53		16		(351)	50 weight % Yt_2O_3
$(Yt, Bi)_2O_3$	C.		O_h-10	10.72		16		(351)	37.4 mol % Bi_2O_3
La_2O_3	H.			3.94_5	6.15_1	1	6.4_8	(351)	
CeO_2	C	CaF_2(4b, 8e)	O_h-5	5.41		4	7.1_8	(83, 111)	
Ce_2O_3	H.			3.88_0	6.05_7	1	6.8_6	(351)	
60 Pr_2O_3	H.			3.85_1	5.99_6	1	7.0_7	(351)	
Pr_6O_{11}	C.			10.98		?		(352)	P. U. C.
Nd_2O_3	H			3.84_1	6.00_9	1	7.2_8	(351)	
Sa_2O_3	C.		O_h-10	10.85		16	7.2_1	(351)	
Eu_2O_3	C.		O_h-10	10.84		16	7.2_9	(351)	
Gd_2O_3	C.		O_h-10	10.79		16	7.6_2	(351)	
66 Tb_2O_3	C		O_h-10	10.70		16	7.9_0	(351)	
Tb_4O_7?	C			10.55		?		(352)	P.U.C. "Brown terbium oxide"
Dy_2O_3	C		O_h-10	10.63		16	8.2_0	(351)	
Ho_2O_3	C.		O_h-10	10.58		16	8.3_5	(351)	
Er_2O_3	C.		O_h-10	10.54		16	8.6_4	(351)	
Tu_2O_3	C		O_h-10	10.52		16	8.7_7	(351)	
Yb_2O_3	C.		O_h-10	10.39		16	9.3_0	(351)	
Lu_2O_3	C.		O_h-10	10.37		16	9.4_2	(351)	
$(NH_4)_3HfF_7$	C	(4d, 4e, 12a, 24u)	O_h-4	9.40		4		(117)	Contains 15% $(NH_4)_3ZrF_7$
75 BeO	H	ZnO(e')	6e-4	2.70	4.39	2	2.98	(109, 163, 333, 364)	u_0 ca. $\frac{3}{8}$.
$Be_4O(C_2H_3O_2)_6$	C.			15.7_2		8	1.38	(56, 62)	A possible atomic arrangement suggested
$Be_4O(C_3H_5O_2)_6$	M.			16.0_0	9.1_8	2	1.26	(62)	P. U. C. $b_0 = 9.7_6$, $\beta = 116° 7'$
MgO	C.	NaCl(4b, 4c)		4.20_8		4	3.59	(86, 107, 109, 110, 121, 132, 222, 271, 287)	
$Mg(OH)_2$	H.	$Mn(OH)_2$(h)	$3D_d$-3	3.11	4.73	1	2.43	(3, 5, 159)	
MgF_2	Tet.	$4D_h$-14(a, f)	$4D_h$-14	4.66	3.08	2	3.11	(328, 345, 367)	$u_p = 0.30$
MgS	C	NaCl(4b, 4c)		5.08		4	2.84	(125)	
$MgCO_3$	H.	$3D_d$-6(a, b, e)	$3D_d$-6	5.61, 48° 12'		2	3.10	(160)	
Mg_2Si	C.	CaF_2(4b, 8e)	O_h-5	6.39		4	1.94	(298)	
Mg_2Sn	C.	CaF_2(4b, 8e)	O_h-5	6.78		4	3.54	(202, 370)	
Mg_2Pb	C.			6.75		4	5.4_7	(370)	Structure probably CaF_2(4b, 8e)
$(Mg, Fe'')_2SiO_4$ olivine	R.		$2D_h$-5	4.77	6.00	4		(28, 212)	14 atomic % of ferrous iron. $b_0 = 10.28$
Al_3Mg_4	C.			4.80			2.62	(24)	More work needed
$MgAl_2O_4$	C	(8f, 16c, 32b)	O_h-7	8.07		8		(80, 189)	$u_0 = 0.37$. Value of a_0 calculated from the best available density ($\rho = 3.57$)
77 CaO	C.	NaCl(4b, 4c)		4.79		4	3.37	(79, 86, 107, 109)	
$Ca(OH)_2$	H.	$Mn(OH)_2$(h)	$3D_d$-3	3.52	4.93	1	2.31	(158)	
CaF_2	C.	CaF_2(4b, 8e)	O_h-5	5.46		4	3.17	(47, 76, 107, 108)	
CaS	C.	NaCl(4b, 4c)		5.68		4	2.60	(79, 125)	
$CaSO_4$	R.		$2D_h$-17	6.21	6.96	4		(326)	Anhydrite, not analyzed. $b_0 = 6.95$
$CaS_2O_6.6H_2O$	Tri.							(15)	Some unreduced measurements have been recorded for this salt
CaSe	C	NaCl(4b, 4c)		5.91		4	3.81	(79)	
$Ca(NO_3)_2$	C.	(4b, 8h, T_h-6(24))	T_h-6	7.60		4	2.47	(245)	
$Ca(F, Cl)Ca_4(PO_4)_3$ apatite	H.		$6C_h$-2	9.4_1	6.88	2		(122)	Composition unknown
$CaCO_3$ (calcite)	H.	$3D_d$-6 (a, b, e)	$3D_d$-6	6.36; 46° 6'		2		(47, 49, 179, 221, 270)	C atoms at (a). $u_0 = 0.25$. A wave length standard
$CaCO_3$ (aragonite)	R.	$2D_h$-16(c, c, c, d)?	$2D_h$-16	4.94	5.72	4	2.94	(88, 286)	A possible atomic arrangement has been suggested. $b_0 = 7.94$
$Ca(HCOO)_2$	R.		$2D_h$-5 ?	10.16	6.20	8	2.03	(323)	P. U. C.
$CaTiO_3$	C.?			7.68		8		(343)	P. U. C. (?) More work necessary
$CaWO_4$	Tet.			3.64	5.64	1		(91)	P. U. C.

Chemical symbol	Crystal system	Structure	Space group	Unit cell, size, Å		M	Calculated density	Lit	Additional data and remarks
				a_0	c_0				
CaMg(CO$_3$)$_2$ (dolomite)	H.	3C$_i$-2(a, b, c, f)	3C$_i$-2	6.02, 47° 7′		1	2.84	(61, 289, 313)	
CaMg(SiO$_3$)$_2$ (diopside)	M.		2C$_h$-6	9.71	5.24	4	3.28	(291)	b_0 = 8.89, β = 74° 10′
Ca(Mg, Fe)(CO$_3$)$_2$	H.	3C$_i$-2(a, b, c, f)	3C$_i$-2	6.02, 47° 7′		1		(289)	30 atomic % of ferrous iron
78 SrO	C.	NaCl(4b, 4c)		5.10		4	5.1$_8$	(107, 109)	
SrF$_2$	C.	CaF$_2$(4b, 8e)	O$_h$-5	5.86		4	4.12	(13)	
SrCl$_2$	C	CaF$_2$(4b, 8e)	O$_h$-5	7.00		4	3.05	(341)	
SrS	C.	NaCl(4b, 4c)		5.87		4	3.90	(128)	
SrSe	C.	NaCl(4b, 4c)		6.23		4	4.55	(230, 231, 308)	
Sr(NO$_3$)$_2$	C.	(4b, 8h, T$_h$-6(24))	T$_h$-6	7.81		4	2.93	(191, 245)	
BaO	C.	NaCl(4b, 4c)		5.50		4	6.0$_8$	(107, 109)	
BaF$_2$	C	CaF$_2$(4b, 8e)	O$_h$-5	6.20		4	4.86	(76)	
BaS	C	NaCl(4b, 4c)		6.35		4	4.37	(128)	
BaSO$_4$	R.		2D$_h$-16	8.89$_8$	7.17$_0$	4	4.43$_2$	(1, 290, 326, 327, 334, 335)	b_0 = 5.44$_8$
BaSe	C.	NaCl(4b, 4c)		6.62		4	4.93	(231, 308)	
Ba(NO$_3$)$_2$	C.	(4b, 8h, T$_h$-6(24))	T$_h$-6	8.11		4	3.23	(191, 245)	Approx. atomic positions are said to be u_N, x_0 and y_0 = ca. ¼, z_0 = ca. 0
81 Li$_2$O	C.	CaF$_2$(4b, 8e)	O$_h$-5	4.61		4	2.01	(26)	
LiH	C.	NaCl(4b, 4c)		4.10		4	0.76	(34)	
LiF	C	NaCl(4b, 4c)		4.01		4	2.65	(76, 88, 132, 367)	
LiCl	C	NaCl(4b, 4c)		5.14		4	2.06	(75, 194, 219)	
LiBr	C.	NaCl(4b, 4c)		5.49		4	3.46	(76, 194, 219)	
LiI	C	NaCl(4b, 4c)		6.00		4	4.0$_9$	(76, 194, 219, 294)	
Li$_2$S	C	CaF$_2$(4b, 8e)	O$_h$-5	5.70		4	1.64	(339)	
Li$_2$C$_2$O$_4$	R?			6.58	6.61	4	2.15	(25)	b_0 = 7.74. P. U. C.
LiCHO$_2$	M?			7.61	4.87	4	1.53	(25)	b_0 = 6.03, β = 95° 42′. P. U. C., S. P.
LiC$_2$H$_3$O$_2$	R ?			12.8$_0$	7.43	12	1.17	(25)	b_0 = 11.6$_8$ P. U. C., S. P.
LiC$_3$H$_5$O$_2$	R ?			16.9$_8$	9.45	16	1.08	(25)	b_0 = 12.15. P. U. C., S. P.
LiC$_4$H$_5$O$_2$ crotonate	H ?			24.8	10.7	48	1.27	(25)	P. U. C., S. P.
LiC$_4$H$_7$O$_2$ butyrate	H ?			27.7	10.1	48	1.07	(25)	P. U. C., S. P.
LiC$_4$H$_7$O$_2$ isobutyrate	Tet ?			19.7$_5$	9.2$_5$	24	1.01	(25)	P. U. C., S. P.
LiC$_5$H$_9$O$_2$ valerate	Tet ?			24.5	9.4	32	1.01	(25)	P. U. C., S. P.
LiC$_5$H$_9$O$_2$ isovalerate	R ?			11.7$_0$	6.93	4	1.00	(25)	b_0 = 8.70. P. U. C., S. P.
LiC$_5$H$_9$O$_2$ trimethylacetate	C ?			18.5$_6$		36	1.00	(25)	P. U. C., S. P.
LiC$_7$H$_{13}$O$_2$ heptylate	Tet ?			27.4	9.3	32	1.02	(25)	P. U. C., S. P.
LiC$_8$H$_{15}$O$_2$ caprylate	H ?			42.1	10.9	72	1.05	(25)	P. U. C., S. P.
LiC$_9$H$_{17}$O$_2$ nonylate	Tet ?			36.6	9.3	48	1.04	(25)	P. U. C., S. P.
LiC$_{11}$H$_{19}$O$_2$ undecylenate	H ?			52.6	9.5	72	0.99	(25)	P. U. C., S. P.
LiC$_{11}$H$_{21}$O$_2$ undecylate	Tet ?			41.8	9.2	48	0.94	(25)	P. U. C., S. P.
LiC$_{12}$H$_{23}$O$_2$ laurate	Tet ?			28.3	11.7	24	0.87	(25)	P. U. C., S. P.
LiC$_{18}$H$_{33}$O$_2$ oleate	H ?			64.6	9.5	72	0.99	(25)	P. U. C., S. P.
LiC$_{18}$H$_{35}$O$_2$ stearate	H ?			62.5	9.8	72	1.04	(25)	P. U. C.
82 NaF	C.	NaCl(4b, 4c)		4.62		4	2.81	(75, 76, 209)	
NaHF$_2$	H.	3D$_d$-5(a, b, c)?	3D$_d$-5	5.17, 39° 44′		1	2.01	(211)	Na at (a), u_F = 0.42. P. S.
NaCl	C.	NaCl(4b, 4c)		5.628		4		(44, 45, 47)	One of the fundamental wave length standards
NaClO$_3$	C.	(4f, 4f, T-4(12))	T-4	6.56		4	2.49	(95, 143, 144, 147, 148, 149, 246, 247, 266)	u_{Na} = ca. 0.06, u_{Cl} = ca. 0.41. Different positions have been suggested for the O atoms
NaBr	C.	NaCl(4b, 4c)		5.94		4	3.24	(75, 76, 273)	
NaBrO$_3$	C	(4f, 4f, T-4(12))	T-4	6.71		4	3.30	(95, 143, 148, 149, 163, 246, 247)	u_{Na} = ca. 0.09, u_{Br} = ca. 0.41. Different positions have been suggested for the O atoms
NaI	C.	NaCl(4b, 4c)		6.46		4	3.67	(75, 76, 273)	
Na$_2$S	C	CaF$_2$(4b, 8e)	O$_h$-5	6.53		4	1.85	(339)	
NaN$_3$	H.	3D$_d$-5(a, b, c)	3D$_d$-5	5.48$_1$, 38° 43′		1	1.83$_8$	(396)	u = 0.42$_8$
NaNO$_3$	H	3D$_d$-6(a, b, e)	3D$_d$-6	6.32, 48° 6′		2	2.19	(47, 267)	N atoms at (a). u_0 = 0.25
NaH(C$_2$H$_3$O$_2$)$_2$	C.		T$_h$-7?	15.9$_8$		24	1.38	(279)	
NaC$_x$H$_y$O$_2$ v. Table C′.									
NaCd$_2$	C.							(202)	Apparently very complicated
NaSb(AlO$_3$)$_3$	H.	6D$_h$-4(a or b, d, f, etc.)	6D$_h$-4	5.40	8.81	2		(10)	u_{Al} < 0.10; O positions not known
83 KF	C	NaCl(4b, 4c)		5.33		4	2.53	(75, 76, 132, 273)	
KHF$_2$	Tet.	4D$_h$-18(a, h)	4D$_h$-18	5.67	6.81	4	2.35	(40)	u_F = 0.14 ± 0.01. The H atoms may have arrangement 4D$_h$-18 (d)
KCl	C.	NaCl(4b, 4c)		6.28$_0$		4	1.98$_7$	(44, 75, 76, 120)	
KBr	C	NaCl(4b, 4c)		6.57$_8$		4	2.76$_0$	(44, 75, 120, 273)	
KI	C.	NaCl(4b, 4c)		7.05$_2$		4	3.12$_4$	(69, 70, 71, 75, 76, 120, 132, 273, 283, 366)	
KI$_3$	M.			9.36		4		(69, 70, 71)	P. U. C. b_0 and c_0 approx. = a_0, and β approx. = 90°.
K$_2$SO$_4$	R.		2D$_h$-16	5.73	7.42	4	2.70	(192, 276)	b_0 = 10.0$_1$
KN$_3$	Tet	4D$_h$-18(a, d, h)	4D$_h$-18	6.09$_4$	7.05$_6$	4	2.04$_5$	(396)	u = 013$_5$
KH$_2$PO$_4$	Tet.		4d-12	7.40	6.96	4	2.36	(342)	K atoms at 4d-12(a); P at 4d-12(b)
KCN	C.	NaCl-like		6.55		4	1.53	(37, 72, 73)	

Chemical symbol	Crystal system	Structure type	Space group	Unit cell, size, Å		M	Calculated density	Lit.	Additional data and remarks
				a_0	c_0				
KCNO	Tet.			6.07$_6$	7.03$_0$	4	2.06$_5$	(396)	Structure similar to KN$_3$
KH$_2$C$_4$O$_4$Cl (H chloromaleate)	R.		2D-16(?)	7.62	10.95	8		(398)	$b_0 = 15.74$
KC$_x$H$_y$O$_z$ s. Table ℭ′.									
K$_2$SnCl$_6$	C.	(4b, 8e, 24a)	O$_h$-5	9.96		4	2.74	(92)	$u_{Cl} = 0.24_8$ and < 0.25
K$_2$Zn(CN)$_4$	C.	(8f, 16c, 32b)	O$_h$-7	12.5$_4$		8	1.66	(93)	$u_C =$ *ca.* 0.34, $u_N =$ *ca.* 0.40, $\frac{1}{2}(u_C + u_N) = 0.37$
K$_2$Cd(CN)$_4$	C.	(8f, 16c, 32b)	O$_h$-7	12.8$_4$		8	1.84	(93)	$\frac{1}{2}(u_C + u_N) = 0.37$
K$_2$Hg(CN)$_4$	C	(8f, 16c, 32b)	O$_h$-7	12.7$_6$		8	2.43	(93)	$\frac{1}{2}(u_C + u_N) = 0.37$
K$_2$PtCl$_4$	Tet.	4D$_h$-1(a, e, j)	4D$_h$-1	6.99	4.13	1	3.40	(95)	$0.233 < u_{Cl} < 0.238$
K$_2$PtCl$_6$	C.	(4b, 8e, 24a)	O$_h$-5	9.7		4	3.$_5$	(219, 220)	Assigned value, $u_{Cl} = 0.16$, probably incorrect
K$_2$PdCl$_4$	Tet.	4D$_h$-1(a, e, j)	4D$_h$-1	7.04	4.10	1	2.65	(95)	$u_{Cl} = 0.23$
KCr(SO$_4$)$_2$.12H$_2$O	C	(4b, 4c, 8h, 8h, T$_h$-6 (24))	T$_h$-6	11.9$_8$		4	1.97	(248)	
KAl(SO$_4$)$_2$.12H$_2$O	C	(4b, 4c, 8h, 8h, T$_h$-6 (24))	T$_h$-6	12.0$_8$		4	1.81	(186, 237, 248, 282)	
KAlSi$_3$O$_8$ (adularia)	M		2C$_h$-3	8.57	7.23	4		(314)	$b_0 = 13.01$, $\beta = 116° 7'$ Composition unknown
KLiSO$_4$	H.		6C 6?	5.13	8.60	2	2.39	(330)	P. U. C. An atomic arrangement is suggested
84 RbF	C ?	CsCl(1a, 1b)?		3.66?		1?		(78, 209, 294)	Structure probably incorrect
RbCl	C.	NaCl(4b, 4c)		6.57$_1$		4	2.81$_2$	(78, 102, 273, 366)	
RbBr	C	NaCl(4b, 4c)		6.86$_8$		4	3.36$_9$	(74, 78, 120)	
RbI	C.	NaCl(4b, 4c)		7.32$_5$		4	3.56$_6$	(77, 78, 120, 273)	
Rb$_2$SO$_4$	R.		2D$_h$-16	5.95	7.78	4	3.66	(192)	$b_0 = 10.3_9$
CsF	C.	NaCl(4b, 4c)		6.01		4	4.6$_2$	(78, 209)	
CsCl	C.	CsCl(1a, 1b)	O$_h$-1	4.11$_0$		1	3.99$_9$	(78, 85, 120)	
CsBr	C.	CsCl(1a, 1b)	O$_h$-1	4.29		1	4.45	(77, 78, 273)	
CsI	C.	CsCl(1a, 1b)	O$_h$-1	4.56$_2$		1	4.51$_4$	(69, 70, 71, 75, 78, 273)	
CsI$_3$	R.			6.82	11.01	4	4.51	(177, 178, 179, 325)	$b_0 = 9.9_5$
CsCl$_2$I	H.	3D$_h$-5(a, b, e)	3D$_h$-5	5.46; 70° 42′		1	3.88	(268)	I probably at (b); $u_{Cl} = 0.31$
CsBr$_2$I	R.		2D$_h$-16	6.57	10.66	4	4.29	(177, 178, 179, 325)	$b_0 = 9.18$
Cs$_2$SO$_4$	R.		2D$_h$-16	6.22	8.20	4	4.30	(192)	$b_0 = 10.8_8$
Tourmaline	H.		3e-1 3e-2	16.2$_8$	7.2$_6$			(152)	P. U. C. Composition unknown
R′AlSi$_3$O$_8$ and R″Al$_2$Si$_2$O$_8$	Tri. and M							(116)	Unreduced powder- and Laue-photographs have been prepared from various feldspars

ℭ-TABLE.—THE ℭ-ARRANGEMENT. *See* ALSO TABLE ℭ′ *infra*

Chemical formula	Name	Crystal system	Unit cell, size, Å			M	Calculated density	Lit.	Remarks
			a_0	b_0	c_0				
CH$_4$N$_2$O	Urea	Tet	5.63		4.7$_0$	2	1.33	(25, 175)	Space group 4d-3
C$_2$H$_2$O$_4$	Oxalic acid	R	6.46	7.79	6.02	4	1.96	(315)	Space group 2D$_h$-15
C$_2$H$_6$	Ethane	H	4.46		8.19	2	0.70$_8$	(349)	C atoms probably at 6D$_h$-4(*f*) with $u =$ *ca.* 0.10 Temperature not stated.
C$_2$H$_6$N$_2$O	*N*-Methylurea .	R.	5.63	5.64	4.70	4?		(171)	Space group 2D-4?
C$_2$H$_7$NO	Acetaldehyde ammonia	H.	8.18, α = 84° 50′			6		(171, 316)	Space group 3D$_h$-5?
C$_2$H$_6$O$_6$	Oxalic acid dihydrate	M	6.05	3.57	11.0	2	1.68	(315)	Space group 2C$_h$-5. $\beta = 106° 12'$
C$_3$H$_8$N$_2$O	1, 2-Dimethylurea	R	4.53	10.9	5.14	2		(171)	Space group 2e-7?
C$_4$H$_2$O$_3$	Maleic anhydride	R	6.58	11.4$_8$	5.90	4	1.44	(25)	P. U. C., S. P
C$_4$H$_2$O$_4$	Acetylenedicarboxylic acid	M?	7.88	9.04	6.62	4	1.70	(25)	$\beta = 111° 6'$. P. U. C., S. P
C$_4$H$_4$NIO$_2$	Iodosuccinimide	Tet	6.29		15.5$_8$	4	2.41	(355)	P. U. C. Space group 4C-2 and 4C-4?
C$_4$H$_4$O$_3$	Succinic anhydride	R	6.95	11.64	5.41	4	1.51	(296)	P. U. C., *cf.* (25)
C$_4$H$_4$O$_4$	Maleic acid .	M	7.49	10.14	7.12	4	1.46	(25, 299)	$\beta = 117° 7'$. Space proup 2C$_h$-5(?)
C$_4$H$_5$NO$_2$	Succinimide. .	R	7.50	9.60	12.75	8	1.42	(296)	P. U. C. Space group 2D$_h$-1?
C$_4$H$_4$O$_4$	Fumaric acid	T.	7.56	15.00	6.20	6		(299)	$\alpha = 90° 40'$, $\beta = 88° 30'$, $\gamma = 89° 48'$
C$_4$H$_6$O$_4$	Succinic acid	M.	5.07	8.92	5.53	2		(296)	$\beta = 91° 20'$. P. U. C., *cf* (25)
C$_4$H$_6$O$_6$	*dl*-Tartaric acid.	Tri	14.8$_2$	9.74	4.90	4		(17)	$\alpha = 82° 20'$; $\beta = 122° 56'$; $\gamma = 111° 52'$. P. U. C.
C$_4$H$_6$O$_6$	*d*-Tartaric acid.	M	7.70	6.04	6.20	2	1.76	(16)	$\beta = 100° 17'$, *cf* (25)
C$_5$H$_8$N$_4$O$_{12}$	Pentaerythritol tetranitrate	Tet	13.2		6.66	4	1.80	(363)	Space group 4D$_h$-7
C$_5$H$_{12}$O$_4$	Pentaerythritol. .	Tet.	6.16		8.76	2		(25, 176, 398)	Space group 4e-9
C$_6$H$_4$N$_2$O$_4$	*o*-Dinitrobenzene . .	M.	7.95	13.0	7.45	4		(55)	$\beta = 112° 7'$. P. U. C.
C$_6$H$_4$O$_2$	Quinone.....	M.	11.4$_0$	6.43	6.85	4	1.40	(25)	$\beta = 93° 20'$. P. U. C., S. P.
C$_6$H$_6$	Benzene.	R.	9.76	7.39	6.85	4	1.04	(64, 101, 378)	P. U. C., measurements at −20°C
C$_6$H$_6$O$_2$	Resorcinol	R	9.56	10.2$_5$	5.64	4		(52, 55)	P. U. C., *cf.* (25)
C$_6$H$_6$O$_2$	Hydroquinol.	M	13.5$_8$	5.22	8.13	4		(52)	$\beta = 107°$. P. U. C.
		H	10.9$_2$		7.55	6	1.39	(25)	P. U. C., Latter S. P.
(C$_6$H$_{10}$O$_5$)x	Cellulose and starch..........	Powder photographs have been obtained and possible units have been suggested						(124, 224)	

Chemical formula	Name	Crystal system	Unit cell, size, Å			M	Calculated density	Lit.	Remarks
			a_0	b_0	c_0				
$C_6H_{12}N_4$	**Hexamethylenetetramine**	C.	7.02			2	1.33_6	(100, 112)	u_N = ca. 0.12, u_C = ca. 0.23_5. Structure type (8a, 12a); space group T_d-4
$C_6H_{14}O_6$	*d(l)*-Mannitol	R.	10.3_6	8 1	4.5_5	2	1.55	(27)	P U. C
$C_7H_6O_2$	Benzoic acid	M.	5.44	5 18	21 6	4		(55)	β = 97° 5′, P U C.
$C_4H_7NO_4$	Ammonium hydrogen fumarate	T.	7 00	7 44	6 56	2		(398)	α = 107° 1′, β = 117° 58′, γ = 69° 16′
$C_4H_6ClN_2O_4$	Ammonium chlorofumarate.	M.	9 30	6 70	6.73_5	2		(398)	β = 108° 25′, Space group 2C-2(?).
$C_7H_6O_3$	Salicylic acid	M.	11.5_6	11.2_2	4 93	4	1 58	(55)	β = 91° 22′. P. U. C
$C_7H_{14}O_6$	α-Methyl glycoside	R.	10.8_6	14.6_6	5 61	4	1.46	(25)	P U C
$C_8H_4O_3$	*o*-Phthalic anhydride	R	7 74	13.6_6	5 86	4	1.54	(25)	P. U. C., S. P.
$C_8H_6O_4$	*o*-Phthalic acid	M.	9.33	7.13	5 10	2	1.60	(25) *cf* (61)	β = 94° 36′. P. U. C, S. P.
$C_8H_{16}O_4$	Metaldehyde.	Tet.	10 36	4.10		8		(171, 316)	Space group 4C-5?
$C_9H_8O_2$	*trans*-Cinnamic acid	M.	11.6_5	14.1_0	4 26	4	1 40	(25)	β = 98° 36′. P. U. C., S. P.
$C_9H_{10}O_2$	Hydrocinnamic acid	M	12.9_0	9 20	6 98	4	1 23	(25)	β = 103° 36′. P. U C, S. P.
$C_{10}H_8$	Naphthalene	M.	8 34	5 98	8 68	2		(53, 57)	β = 122° 44′. P U. C., *cf.* (25)
$C_{10}H_8O$	α-Naphthol	M	13 1	4 9	13 4	4	1 22	(53)	P. U. C. β = 117° 10′
$C_{10}H_8O$	β-Naphthol	M	11.70	4 28	17 4	4	1 22	(53)	P U. C. β = 119° 48′
$C_{12}H_{10}$	Acenaphthene	R.	8 32	14.1_5	7 26	4	1 19	(53)	P. U. C.
$C_{12}H_{10}N_2$	Azobenzene	M	12.5_0	5 28	8 38	2	1 23	(25)	β = 116° P. U. C.
$C_{12}H_{12}N_2$	Hydrazobenzene	R.	11.1_0	9.93	9 33	4	1 17	(25)	P U. C., S P.
$C_{12}H_{22}O_{11}$	Saccharose.	M	10.6_5	8.7_0	8.0_0	2	1 57	(27)	β = 105° 44′ P. U. C.
$C_{12}H_{24}O_2$	Lauric acid	Tet.?	28.3		11 4	24	0 86	(25)	P U C., S. P. *See* Table **ℭ′**.
$C_{14}H_8O_2$	Anthraquinone	R	12.0_5	15.0_5	2 69	2	1.40	(25)	P U C, S. P.
$C_{14}H_{10}$	Anthracene.	M	8 58	6 02	11.18	2	1 25	(53, 57)	β = 125°. P. U. C, *cf.* (25)
$C_{14}H_{10}$	Phenanthrene	M.	9.56	6 72	7 55	2	1 18	(25)	β = 92°. P. U. C., S. P.
$C_{14}H_{10}O_2$	Benzil	H	8.15		13.4_6	3	1 41	(27)	P U. C.
$C_{14}H_{12}$	Stilbene	M	9 6	8 9	12.6	4	1 25	(27)	β = 118° 40′. P. U. C.
$C_{14}H_{14}$	Dibenzyl.	M	12.7	6 1	7.4	2	1 18	(27)	β = 110°. P. U. C.
$C_{14}H_{28}O_2$	Myristic acid	H?	$57._4$		$11._4$	72	0 83	(25)	P U C., *see* Table **ℭ′**.
$C_{16}H_{10}N_2O_2$	Indigotin	H.	20 2		12.1_5	12	1 20	(25)	P U C, Measurements also on S. P.
$C_{16}H_{32}O_2$	Palmitic acid	H.?	$60._0$		$11._0$	72	0 88	(25)	P. U. C, *see* Table **ℭ′**.
$C_{18}H_{34}O_2$	Elaidic acid	Tet ?	26.5		$10._8$	16	0.98	(25)	P. U. C, S P., *see* Table **ℭ′**.
$C_{18}H_{36}O_2$	Stearic acid	H.?	62.0		10.7	72	0.94	(25)	P. U. C., S. P, *see* Table **ℭ′**.
$C_{19}H_{16}$	Triphenylmethane	R.	14.5_2	25.6_2	7.42	4		(22, 26) *cf.* (177, 178)	
$C_{19}H_{16}O$	Triphenylcarbinol	H.	16.5		8.8	6	1 23	(27)	P. U. C.
$C_{39}H_{76}O_5$	*α, α′*-Distearin.	H ?	81.5		10 8	48	0 82	(25)	P U C, S. P

ℭ′-TABLE.—LONG CHAIN COMPOUNDS

Arrangement by Classes

1. *Aliphatic Hydrocarbons* (320, 401)

Formula	Maximum spacing, Å	Spacings of broad lines, Å					
	d_1	d_2	d_3	d_4	d_5	d_6	d_7
$C_{17}H_{36}$	24.3	4 25	3 93		2.54	2.32	
$C_{18}H_{38}α$	25.9		4.0				
$C_{18}H_{38}β$	23.9	4 58	3.80	3.66	2.61		2 05
$C_{19}H_{40}$	26.9	4 22	3 84		2 52	2 25	
$C_{20}H_{42}α$	28.0		3 9				
$C_{20}H_{42}β$	26.2	4.63	3.82	3.61	2 59	2 12	2 03
$C_{21}H_{44}$	29.4_5	4.17	3.77	3 01	2 50	2 25	
$C_{23}H_{48}$	32.2						
$C_{24}H_{50}$	33.0_5	4 18	3 80	3 02	2.50	2 25	
$C_{27}H_{56}$	37.1	4.17	3.77	3 01	2 51	2 25	
$C_{31}H_{64}$	43.0	4.14	3 74	2.99	2.49	2 21	
$C_{35}H_{72}$	47.7						

Formula	Max. spacing	Formula	Max. spacing
$C_{22}H_{46}$(?)	30.6	$C_{30}H_{62}$	40 4
$C_{24}H_{50}$	32.9	$C_{31}H_{64}$	41 6*
$C_{25}H_{52}$	34.3		42 9†
$C_{26}H_{54}$	35 6	$C_{32}H_{66}$	42.7
$C_{28}H_{58}$	37.7	$C_{34}H_{70}$	45.3
$C_{29}H_{60}$	39 4		

Specimens for (320) pressed, those for (401) melted on glass plates only.

* Melted. † Pressed.

2. *Aromatic Hydrocarbons*

$C_{24}H_{42}$, Octadecylbenzene, $d_1 = 49.2_9$(225)

3. *Aliphatic Acids*

a. Monobasic

Formula	Name	Maximum spacing, Å d_1	Broad line spacing, Å				Lit.
			d_2	d_3	d_4	d_5	
CH_2O_2	Formic	5 19					(309)
$C_2H_4O_2$	Acetic	6.66					(309)
$C_3H_6O_2$	Propionic	6.75	4.03			3.43	(309)
$C_4H_8O_2$	Butyric	9.65	4.09	3.65		3.45	(309)
$C_5H_{10}O_2$	Valeric	10.1(?)					(309)
$C_6H_{12}O_2$	Caproic	14.6	4.14	3.65		3.47	(309)
$C_7H_{14}O_2$	Heptoic	16.4	4.29	3.75	3.97	3.49	(309)
$C_8H_{16}O_2$	Caprylic	19.0	4.14	3.65		3.48	(309, 354)
$C_9H_{18}O_2$	Nonylic	22.9	4.22	3.71	3.97	3.48	(309)
$C_{10}H_{20}O_2$	Capric	23.3	4.14	3.73			(354, 309, 274)
$C_{11}H_{22}O_2$	Undecylic	25.8					(185)
$C_{12}H_{24}O_2$	Lauric	27.0	4.11	3.68			(184, 354)
$C_{14}H_{28}O_2$	Myristic	32.2	4.12	3 72			(184, 354)
$C_{15}H_{30}O_2$	Pentadecylic	36.2	4.00	3.76			(185)
$C_{16}H_{32}O_2$	Palmitic	34.7	4.08	3.65			(184, 354)
$C_{17}H_{34}O_2$	Margaric	39.2	4.05	3.77			(185)
$C_{18}H_{34}O_2$	Oleic	36.2(?)					(185)
$C_{18}H_{34}O_2$	Isoleic	35.9					(185)
$C_{18}H_{34}O_2$	Elaidic	48.3	4.03	3.65			(185)

3. *Aliphatic Acids.* a. *Monobasic.—(Continued)*

Formula	Name	Maximum spacing, Å d_1	Broad line spacing Å d_2	d_3	d_4	d_5	Lit.
$C_{18}H_{36}O_2$	Stearic	38.7	4.05	3.62			(184, 354)
$C_{22}H_{42}O_2$	Erucic	46.3	4.22	3.72			(185)
$C_{22}H_{42}O_2$	Brassidic	59.9	4.25	3.72			(185)
$C_{22}H_{44}O_2$	Behenic	47.8	4.10	3.66			(184)
		b. Dibasic					
$C_4H_6O_4$	Succinic	4.5					(354)
$C_6H_{10}O_4$	Adipic	7.0					(354)
$C_7H_{12}O_4$	Pimelic	7.6					(354)
$C_8H_{14}O_4$	Suberic	9.3					(354)
$C_9H_{16}O_4$	Azelaic	9.6					(354)
$C_{10}H_{18}O_4$	Sebacic	11.4					(354)

4. *Salts*

Formula	Name	Maximum spacing Å d_1	Broad line spacing Å d_2	d_3	d_4	d_5	Lit
$PbC_{12}H_{22}O_4$	Caproate	20.0					(355)
$PbC_{16}H_{30}O_4$	Caprylate	25.4					(355)
$PbC_{20}H_{38}O_4$	Caprate	30.6					(355)
$PbC_{24}H_{46}O_4$	Laurate	35.8					(355)
$PbC_{28}H_{54}O_4$	Myristate	41.2					(355)
$PbC_{32}H_{62}O_4$	Palmitate	46.3					(355)
$PbC_{36}H_{66}O_4$	Oleate	37.5; 29.8					(355)
$PbC_{36}H_{66}O_4$	Elaidate	50.0					(355)
$PbC_{36}H_{70}O_4$	Stearate	51.3					(355)
$NaC_{12}H_{23}O_2$	Laurate	33.5	4.22	4.88			(208)
$NaC_{14}H_{27}O_2$	Myristate	38.5	4.18	4.9			(208)
$NaC_{16}H_{31}O_2$	Palmitate	43.5	4.15	4.9			(208)
$NaC_{18}H_{33}O_2$	Oleate	43.5					(63)

Similar results obtained with K and NH_4 oleates

5. *Esters*

$C_{17}H_{34}O_2$	Methyl palmitate	22.0	4.07	3.72			(225)
$C_{18}H_{18}N_2O_5$	Ethyl *p*-azoxybenzoate	16.2	d_1 = 19.9 in the "smectic" state				(321)
$C_{18}H_{36}O_2$	Ethyl palmitate	23.2	4.07	3.67			(225)
$C_{19}H_{38}O_2$	Methyl stearate	24.0	4.07	3.74			(225)
$C_{20}H_{40}O_2$	Ethyl stearate	25.2	4.14	3.69			(225)
$C_{24}H_{48}O_2$	Octyl palmitate	30.4	4.16	3.72			(225)
$C_{32}H_{64}O_2$	Cetyl palmitate	40.4	4.05	3.69			(225)
$C_{54}H_{104}O_6$	Glycerol margarate	48.0					(355)

6. *Ketones* (319)

Formula	Name	Maximum spacing Å d_1
$C_{13}H_{26}O$	Di-*n*-hexyl	18.7
$C_{15}H_{30}O$	Methyl-*n*-tridecyl	42.4
$C_{17}H_{34}O$	Methyl *n*-pentadecyl	47.6
$C_{18}H_{36}O$	Methyl *n*-hexadecyl	50.0
$C_{18}H_{36}O$	Ethyl *n*-pentadecyl	25.2
$C_{18}H_{36}O$	Hexyl *n*-undecyl	25.2
$C_{19}H_{38}O$	Methyl *n*-heptadecyl	52.9
$C_{19}H_{38}O$	Propyl *n*-pentadecyl	26.3
$C_{20}H_{40}O$	Ethyl *n*-heptadecyl	27.3
$C_{21}H_{42}O$	Propyl *n*-heptadecyl	28.9
$C_{22}H_{44}O$	Hexyl *n*-pentadecyl	31.1
$C_{23}H_{46}O$	Di-*n*-undecyl	31.6
$C_{24}H_{48}O$*	Hexyl *n*-heptadecyl	33.6
$C_{27}H_{54}O$	Di-*n*-tridecyl	37.0
$C_{31}H_{62}O$	Di-*n*-pentadecyl	41.1
$C_{35}H_{70}O$	Di-*n*-heptadecyl	47.2

* A few orders of 30.8Å also present.

7. *Phenols* (225)

$C_{22}H_{38}O$	*p*-Hexadecyl	46.5
$C_{24}H_{42}O$	*p*-Octadecyl	51.3

TABLE D.—ALLOYS

(a) Non-ferrous. Standard Arrangement. All Compositions in Atomic %

Pb-Sn.—0 to 3.6% Sn alloys are F.-c. cubic (like Pb) with a_0 decreasing to 4.93_1Å, taking a_0 for Pb as 4.94_2Å. 10% – 95% Sn alloys are mixtures of the Pb-like and Sn structures. 95% – 100% Sn alloys show no measurable distortion in size or shape of the Sn unit cell (206).

Hg-Sn.—The structure varies, as follows, with the atomic % of Hg: 0 to ±2%, Tet.-Sn structure I; 2% I, with traces of "Hexagonal" amalgam, (composition unknown) structure II; 5%, I and II; 6%, trace of I with II; 6 to ±17%, II; ±17 to 33%, II and liquid alloy (229).

Hg-Pb.—A 20% Hg alloy had the F.-c. cubic structure (4*b*) of Pb, with a unit cell length 1.6% less than that of Pb (229).

Hg-Zn.—Two structures, the hexagonal Zn structure (*d*), and an "hexagonal" structure belonging to an amalgam of unknown composition. The relative intensities of the patterns of these two phases are as follows (229):

Atomic % Hg	0	10	20	35
Zn structure	strong	medium	weak	absent
"Amalgam" structure	absent	medium	strong	strong

Hg-Cd.—An 18% Hg amalgam gave a pattern substantially the same as that of Cd; 37 and 50% Hg amalgams yield a different pattern (229).

Cu-Si.—Though Si has the smaller atomic volume the unit cube of Cu which has dissolved Si is larger than that of pure Cu. No data available (84).

Cu-Sn.—Figure 12*a*. Black circles: metal melted in air; open circles: metal melted in vacuum (18, 372).

Cu-Zn.—Figure 13. Unless otherwise stated on the figure these data are from (198). *Cf.* (12, 199, 258, 375, 371) which gives a different structure for γ-brass.

Ag-Sn.—Solution of Sn increases the Ag unit though its atomic volume is less. No data available (84).

Ag-Zn.—The observed phases are the same as those for Cu-Zn alloys (371).

Phase	Composition wt. % Zn	Symmetry	Structure	a_0 Å	c_0 Å	No. atoms in unit cell
β	38 25	Cubic	(1*a*, 1*b*)	3.15_6		2
γ	50 3	Cubic		9.32_7		52 37
ε	60 5	Hexagonal	Mg-like	$2\ 81_8$	$4\ 45_6$	2
	78 1	Hexagonal	Mg-like	$2\ 81_5$	$4\ 38_2$	2
η	Hexagonal close-packed with Zn-like structure					

Ag-Cu.—Broken series of solid solutions. Both components F.-c cubic (4*b*) (370).

At. % Cu	0	4	9 2	16-80	96 4	100
a_0	4 06	4 05	4 03	Superimposed patterns of Ag and Cu	3 61	3 61

Au-Zn.—These alloys show all the phases of Cu-Zn alloys and two additional (371).

Phase	Composition wt. % Zn	Symmetry	Structure	a_0 Å	c_0 Å	No atoms in unit cell
β	30 2	Cubic	(1*a*, 1*b*)	$3\ 14_6$		2
γ	36 9	Cubic		$9\ 26_8$		52 97
	41 1	Cubic		$9\ 22_3$		51.96
ε	67 5	Hexagonal	Mg-like	$2\ 80_9$	$4\ 37_7$	2
	72 3	Hexagonal	Mg-like	$2\ 80_9$	$4\ 36_9$	2
η	95 0	Hexagonal	Zn-like	$2\ 67_4$	$4\ 88_7$	2
γ′ ($AuZn_3$)?	50 2	Cubic	?	$7\ 88_0$		32
γ″		may be cubic				

Au-Cu.—Figure 12 (18, 145, 361).

Au-Ag.—Data conflicting. Probably an unbroken series of solid solutions, though marked variations from this relation have been reported. Figure 16 (18, 165, 239, 372).

Ir-Os.—A single alloy of unknown composition was found to be C.-p. Hex. (11).

Pd-H.—Data conflicting. One result (295, 376) shows that the Pd unit is swelled by an amount proportional to the quantity of occluded H (79). The other study (164) shows a discontinuous absorption of H in the sense that some crystals may be saturated though others in the same material have not begun to absorb gas. The length, a_0, of the edge of the unit cube of the saturated solution was found to vary between 4.00_0Å and 4.03_9Å with values usually not less than 4.02_3Å.

Pd-Cu and Pd-Au.—Figures 20 and 19 (301).

Pd-Ag.—(15) Figure 17 (165).

Mn-Cu.—67% Cu is F.-c. cubic, like Cu, and has $a_0 = 3\ 61_5$Å, taking a_0 for Cu as 3.60Å (18). 70% Cu is said to give a_0 = 3.70Å (200, 384).

Ni-Cu.—Figure 15 (18, 197, 361, 370).

Cr-Ni.—100% to 40% Ni alloys are F.-c. cubic (like Ni) with values of a_0 which change proportionately to the % of Cr added from 3.52_1Å (for Ni) to 3.57_6Å (206).

W-Mo.—(67) Said to show an unbroken series of solid solutions. No numerical data available (18). No lines (86) have been found from a 1:1 alloy to indicate the existence of a compound W-Mo (239).

Al-Zn.—0 to 20% Zn alloys are F.-c. cubic (like Al), a_0 changing from 4.04_3Å (for Al) to 4.03_4Å. 20%–95% Zn alloys show mixtures of cubic Al and hexagonal Zn structures. 95%–100% Zn alloys are C.-p. hexagonal with no measurable distortion from size or shape of the Zn unit cell (206).

Al-Cu.—Figure 14. The data on this figure are from (22, 141, 197, 258).

Al-Ag.—The dissolving of Al in Ag increases the unit cube in the latter, though Al has a smaller atomic volume. No numerical data available (84).

Al-Mn-Cu.—Heussler Alloys. Alloy 15.9% Al, 23.9% Mn, 60.3% Cu is said to be F.-c. cubic with a_0 = 3.70Å. Alloys 14.3% Al, 28.6% Mn, 57.1% Cu is said to be a mixture of the preceding structure with a smaller amount of a B.-c. cubic phase having a_0 = 2.98Å (12, 297).

Mg-Sn.—0 to 67% Mg give the superimposed patterns of Sn and Mg_2Sn; 67–100% Mg yield the superimposed patterns of Mg_2Sn and Mg. No evidence of solid solution (370).

Mg-Pb.—0 to 67% Mg give the superimposed patterns of Pb and $PbMg_2$; 67–100% Mg yield the superimposed patterns of $PbMg_2$ and Mg. No evidence of solid solution (370).

Mg-Al.—91.2% Al is F.-c cubic (4*b*) with a_0 = 4.10_6Å, taking a_0 for Al as 4 05Å. 7 3% Al is C.-p. hexagonal (*d*) with a_0 = $3\ 15_1$Å, *c* = 5 23Å, taking a_0 for Mg as 3.17Å and c_0 = 5.17Å (197).

(*b*) *Ferrous Alloys*

Fe-C Steels.—(1) Austenitic Steels. Structure that of γ-Fe, F.-c. cubic (4*b*) (250 259)

Composition, wt. %	a_0 in Å	Remarks
(1) 1.25% C, quenched at 750°C	3 601	Contains also martensite.
(2) 1 98% C, quenched at 1100°C	3 629	Contains also martensite.
(3)* 1.34% C, 12.1% Mn, 0 52% Si, 0.1% P	3 621	
(2) quenched at 750°C	3 606	A mixture of austenite and martensite.
(4) 1.18% C, 24.3% Ni, 6.05% Mn quenched from 1000°C	3 64	
(5) 0.24% C, 25.2% Ni, quenched from 1000°C	3 56	

* Density calculations thought to indicate that C is present in interstitial solid solution in steel No (3)

(2) Martensite Steels. Structure that of α-Fe, B.-c. cubic (2*a*) (19, 122, 250 258).

(5) Chilled subsequently in liquid air	2 81	Partly martensite and partly austenite.
(2)	2 90	Martensite lines very diffuse.
(1)	2 88	Martensite lines very diffuse.
(6) 0.80% C quenched in oil from 750°C	2 89	Martensite lines very diffuse.
(7) 0.80% C, 0.14% Cr, 0.35% Mn, 0.19% Si	$2\ 85_1$	Broad lines, less intense than from Fe.
(8) 1.31% C, 0.12% Cr, 0.24% Mn, 0.17% Si	$2\ 85_1$	Density calculations from this steel thought to indicate that C isomorphously replaces Fe unless martensite is annealed when it is a mixture of α-Fe with cementite.

Fe-Si.—(207, 252, 389).

Weight % Si	0–15	17–30	33	40	50	75–100
Phases.......	Fe	Fe + FeSi	FeSi	FeSi + $FeSi_2$	$FeSi_2$	$FeSi_2$ + Si

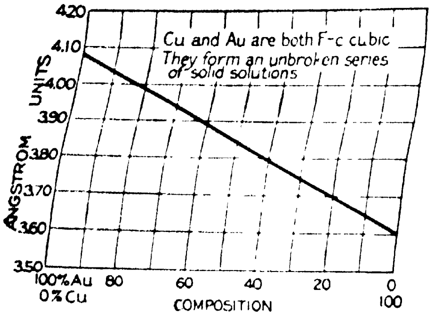

FIG. 12.—The diffraction data on Cu-Au alloys.

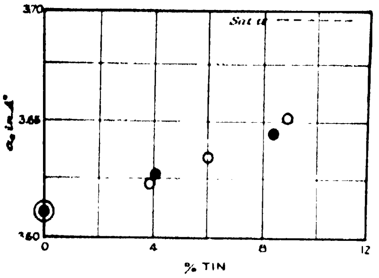

FIG. 12a.—The diffraction data on Cu-Sn alloys.

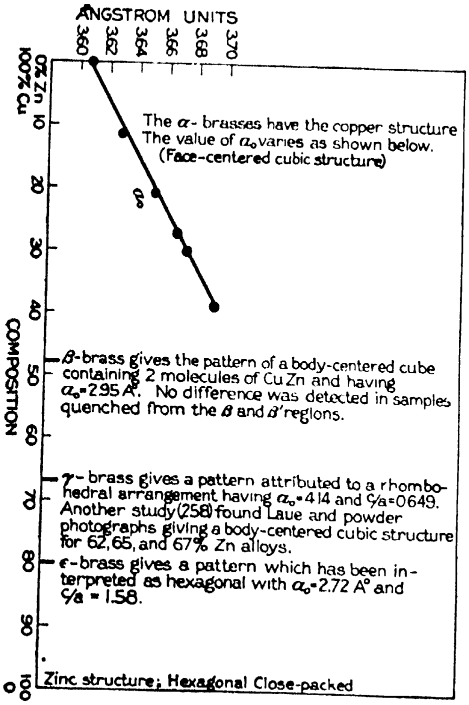

FIG. 13.—The diffraction data on brasses.

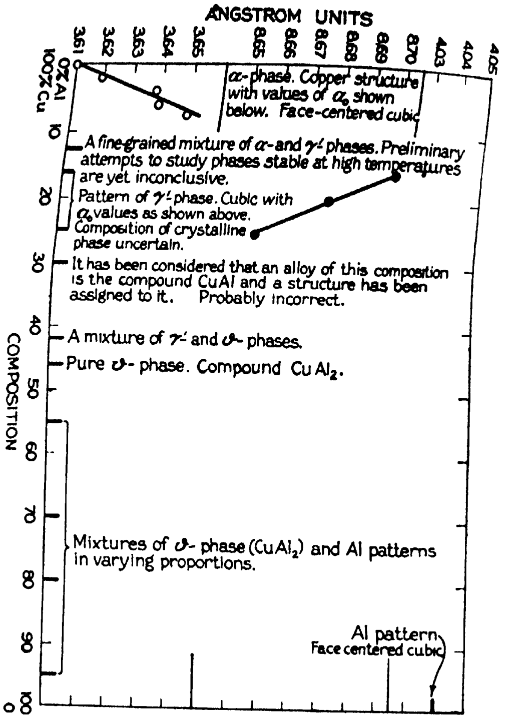

FIG. 14.—The diffraction data on Cu-Al alloys.

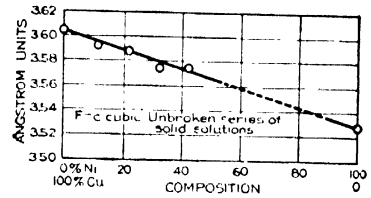

FIG. 15.—The diffraction data on Cu-Ni alloys.

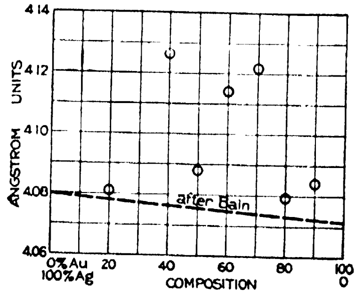

FIG. 16.—The diffraction data on Ag-Au alloys.

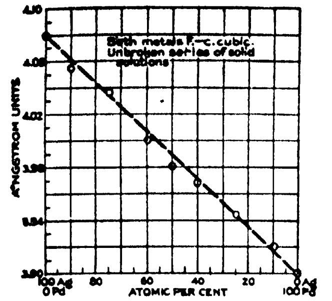

FIG. 17.—The diffraction data on Ag-Pd alloys.

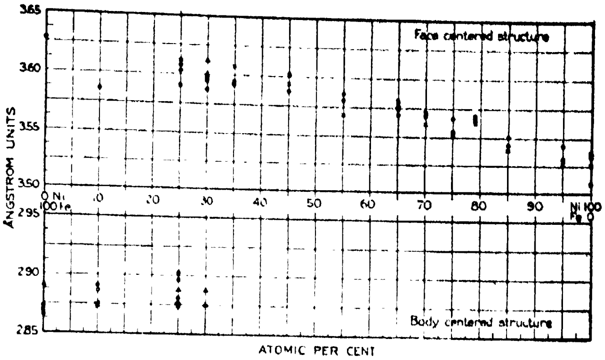

FIG. 18.—The diffraction data on Fe-Ni alloys.

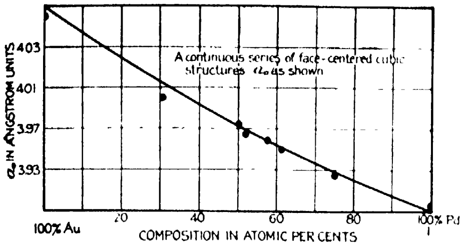

FIG. 19.—The diffraction data on Au-Pd alloys.

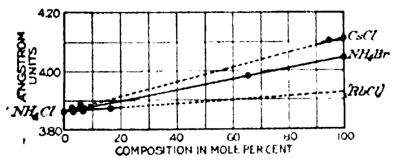

FIG. 21a.—The diffraction data on solid solutions of the alkali halides

Fe-Mn.—These alloys are said to have the following structures No numerical data available ([18]).

Atomic % Mn.	0–30	30 60	60 100
Structure.	B.-c. cubic (2*a*)	F.-c. cubic (4*b*)	Complex Mn

Fe-Co.—No numerical data available ([12]).

Weight % Co	0-80	85	90-98	98-100
Structure.	B.-c. cubic (2*a*)	B.-c. (2*a*) with F.-c. (4*b*)	F.-c. cubic (4*b*)	F.-c (4*b*) with C.-p. hex

Fe-Ni.—The best available data are shown in Fig. 18 The fused alloys were swaged, drawn and rolled into thin tapes. Spacings from photographs of these specimens without further treatment are shown as open circles, results after (1) annealing at 900–950°C followed by slow cooling, black circles; (2) after an additional heating to 600°C followed by rapid cooling in the air, crosses; and (3) after cooling for a time in liquid air following (1), triangles ([12, 168]).

Fe-Cr.—Interpretation of data uncertain ([18]).

Fe-W and **Fe-Mo.**—It is said that Fe dissolves a few atomic percents of each of these metals without apparent alteration in the size of the unit cell. In each case a 1:1 compound is formed. No numerical data available ([18]).

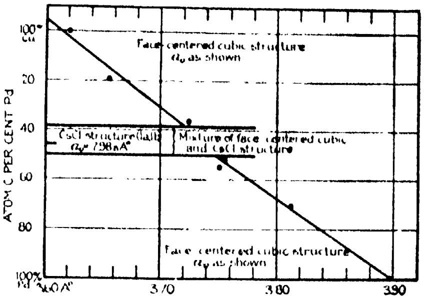

FIG. 20.—The diffraction data on Cu-Pd alloys.

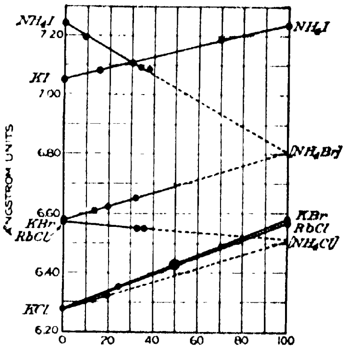

FIG. 21b.—The diffraction data on solid solutions of the alkali halides.

Ɛ-TABLE.—THE POSITIONS OF X-RAY DIFFRACTION BANDS FROM LIQUIDS

Angle of Deviation and Wave Length, λ, of X-rays Used

Liquid	A		N_2	O_2	
Angle, deg	13.0; 18.9	27	11.3; 17.0	12.5; 19.5	27
λ, in Å	0.712	1.54	0.712	0.712	1.54
Lit.	(304)	(303)	(304)	(303)	(302)

Liquid	H_2O		CS_2	HCOOH	CH_3CHO Acetaldehyde
Angle, deg	13.4	29	13.2	24	22.7
λ, in Å .	0.712	1.54	0.712	1.54	1.54
Lit.	(304)	(303)	(304)	(303)	(373)

Liquid	C_2H_5OH	$C_4H_8O_2$ Butyric acid	$C_4H_8O_2$ Ethyl acetate	$(C_2H_5)_2O$
Angle, deg	22	20.7; 36.5	20.7	19
λ, in Å	1.54	1.54	1.54	1.54
Lit	(303)	(373)	(373)	(303)

Liquid	C_6H_6		$(C_2H_4O)_3$ Paraldehyde	C_6H_5CHO Benzaldehyde
Angle, deg	8.5	18	23.3	19.3; 44.4
λ, in Å	0.712	1.54	1.54	1.54
Lit	(301)	(302, 303)	(373)	(373)

Liquid	C_8H_{18}	C_9H_{12} Mesitylene	$C_{14}H_{12}O_2$ Benzyl benzoate
Angle, deg	8.1	4.1; 6.2	18.3; 42.7; 65.8
λ, in Å	0.712	0.712	1.54
Lit	(301)	(301)	(373)

𝔍-Table.—Data on Solid Solutions of Salts

Alkali Halides.—For data on the solutions NH_4I-NH_4Br, NH_4I-KI, NH_4Br-KBr, RbCl-NH_4Cl, NH_4Cl-KCl, KCl-RbCl, KCl-KBr, CsCl-NH_4Cl, NH_4Br-NH_4Cl, RbCl-NH_4Cl see Fig. 21 (120). For additional data on KBr-KCl see (387, 388).

AgCl-NaCl (387).—Broken series of solid solutions. Quenched preparations: Both patterns present together.

	Composition mol % AgCl	a_0 Å
Annealed	100	5.53
	75	5.54
	50	5.57

AgCl-AgBr (402).—Both structures like NaCl (*4b*, *4c*). Unbroken series of solid solutions

Composition mol % AgCl	a_0 Å
0	5.77
20	5.72
40	5.68
50	5.65
60	5.63
80	5.59
100	5.54

AgBr-AgI (402).—Broken series of solid solutions

Composition mol % AgI	a_0				
	Fused and slowly cooled		Fused and quenched		Precipitated
	Structure (*4b*, *4c*)	Structure (*4b*, *4d*)	Structure (*4b*, *4c*)	Structure (*4b*, *4d*)	Structure (*4b*, *4c*)
0	5.76_8		5.76_8		5.76_8
10	5.81_4		5.81_6		5.80_6
20	5.84_2		5.85_1		5.84
30	5.86		5.87_6		5.87_8
40	5.89_6	(6.47)	5.90_8		
50	5.91_3	(6.47)	5.93_2		
60	5.91_8	6.47	5.96	(6.48)	
70	6.01_4 5.94_6 5.99_4	6.48	5.95_6	6.48	
80	5.91_6	6.47	(5.89_2)	(6.48)	
90		6.47_2	5.89_8	6.48_3	
95		6.48_1		6.48_7	
100		6.49_3		6.49_3	

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SOME NUMERICAL DATA PERTAINING TO DISPERSOIDOLOGY

P. P. von Weimarn

From the large and heterogeneous mass of numerical data recorded in the literature of "Colloids," it seems desirable to present here only some selected illustrative examples of results of physical measurements which meet the following requirements: (1) The composition of the system is definite, reproducible, and exactly known; (2) all of the essential variables which affect the system are understood and are accurately controlled or measured; (3) the system, its behavior, and the resulting quantitative data are reproducible in the hands of any investigator working under *these same* controllable conditions; and (4) the examples selected shall be illustrative of some general law describing the behavior of dispersed systems.

As meeting the above conditions, the following examples have been selected and are presented in graphical form. Concise explanations are given in connection with the graphs. For a detailed description, explanation, discussion, and bibliography, the reader is referred to von Weimarn, Chem. Rev. **2**: 217; 25.

THE PRECIPITATION LAWS

Figures 1-9 illustrate the following precipitation laws: With increasing concentration of the reacting solutions, the average size of the precipitated crystalline individuals (*not their aggregates*) (1) passes through a maximum during, and (2) decreases continually after the completion of, the process of direct crystallization; (3) for the same absolute concentration of the reacting solutions (*other conditions being equal*), with decreasing solubility of a substance (Fig. 4; *cf.* Fig. 13), the average size of the precipitated crystals also decreases.

Figures 10-13 show that, if the aggregation of the individual ultramicrocrystals has not *proceeded too far*, the second law of precipitation remains valid; and besides they illustrate the law: (4) With increasing viscosity of the dispersion medium, the average size of the particles decreases (Fig. 12) (3, 4); *cf.* (1).

The following general remarks apply to the figures: (1) The dispersion medium is indicated thus (60 vol. % C_2H_5OH); (2) mixing was brought about in all cases by pouring and shaking. The direction of pouring is indicated by the arrow. (3) In Figs. 1-9, the volumes mixed in each experiment satisfied the relation, concentration × volume = a constant (approx.), for a given dispersion medium; (4) the time, t_0, represents the period (*ca.* 10-15 min) required for the operations of sampling and photomicrographing; (5) all data shown are the averages of at least two independent experiments.

1. Precipitation of Ag_2SO_4.—*Reaction.*—$2AgNO_3 + MnSO_4 = Ag_2SO_4 + Mn(NO_3)_2$ (Figs. 1-7). In Figs. 4-5, per liter of final solution, $C = Ag_2SO_4$ produced by the reaction and S = its solubility, both in g-equivalents (8).

2. Precipitation of $AgC_2H_3O_2$.—*Reaction.*—$AgNO_3 + KC_2H_3O_2 = AgC_2H_3O_2 + KNO_3$ (Figs. 8-9) (6). These curves show the effect of time; the periods of time for the four curves are the same in both figures.

3. Precipitation of Se.—*Reaction.*—(*a*) 5 cc of aniline (an.) containing *m* mg of Se are poured into 100 cc of 93.5 wt. % C_2H_5OH (alc.) or (Fig. 13) mixtures thereof with an. or (Fig. 12) glycerol (gl.). $t = 20°$ (Figs. 10-13 *a* curves) (7). (*b*) As in (*a*) but with quinoline (q.) instead of aniline and using 90 wt. % C_2H_5OH (Figs. 10-13 *b* curves) (7).

4. Effects of Salts Dissolved in the Dispersion Medium on the Duration of Life of Dispersoidal Solutions.—(*a*) *$BaSO_4$ Reaction.*—50 cc ($2a + 2x$ equiv.) BaR_2 + 50 cc ($2a$ equiv.) $MnSO_4$ = 1 equiv. $BaSO_4$ + 1 equiv. MnR_2 + x equiv. BaR_2. Dispersion medium, 63 wt. % C_2H_5OH (Figs. 14-17) (5).

(*b*) *S.*—Dispersoidal solution of sulfur prepared by the method of grinding with grape-sugar. *Ca.* 25 mg S per liter of H_2O, particles *ca.* 85$\mu\mu$ (Figs. 18-23). C = millimols salt per liter. The dotted horizontal is for $C = 0$. To the right of the dotted vertical (Fig. 23) the disperse phase begins to dissolve by chemical action (10); *cf.* (2).

(*c*) *$Al(OH)_3$.*—Prepared as in (*b*) *supra*. *Ca.* 55 mg $Al_2O_3.3H_2O$ per liter of H_2O; particles *ca.* 90$\mu\mu$ (Fig. 24). The dotted horizontal is for $C = 0$. Dissolving begins at points marked with crosses (11); *cf.* (2).

5. Adsorption and Solubility of Salts.—Adsorbent used—$BaSO_4$ extra pure; 20 g used per 100 cc of the salt solution. After shaking the solution with the adsorbent for 10 min, 24 hr. were allowed for the precipitate to settle. Fifty cc of the upper clear layer were used for analysis. Because partial dispergation occurred in the case of $BaCl_2$ in dilute C_2H_5OH solutions, these were centrifuged before analysis (Fig. 25) (9).

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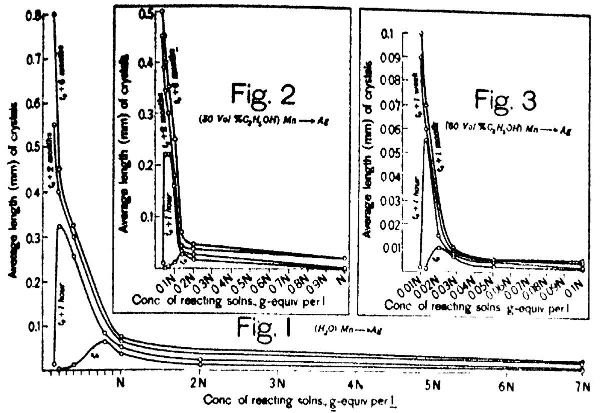

Fig. 1 (H₂O) Mn → Ag

Fig. 2 (80 Vol % C₂H₅OH) Mn → Ag

Fig. 3 (80 Vol % C₂H₅OH) Mn → Ag

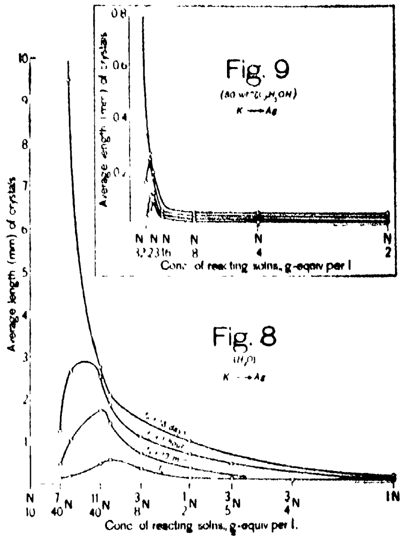

Fig. 9 (80 wt % C₂H₅OH) K → Ag

Fig. 8 (H₂O) K → Ag

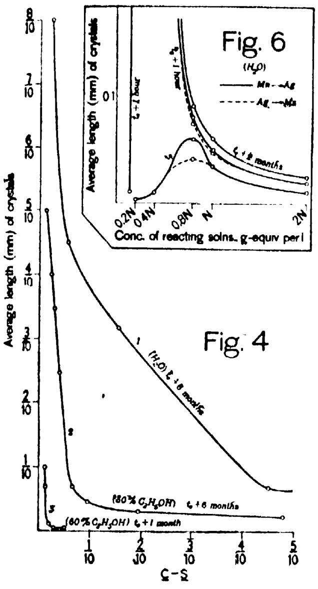

Fig. 6 (H₂O) Mn → Ag; Ag → Mn

Fig. 4

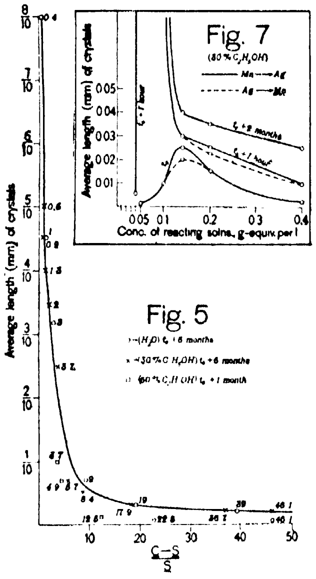

Fig. 7 (80% C₂H₅OH) Mn → Ag; Ag → Mn

Fig. 5

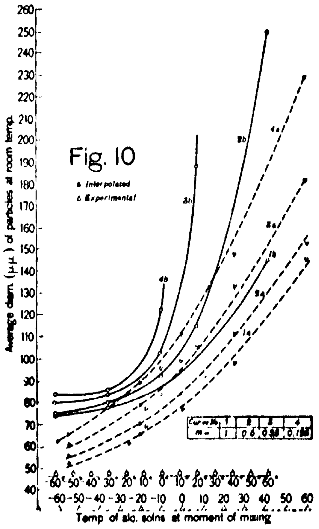

Fig. 10

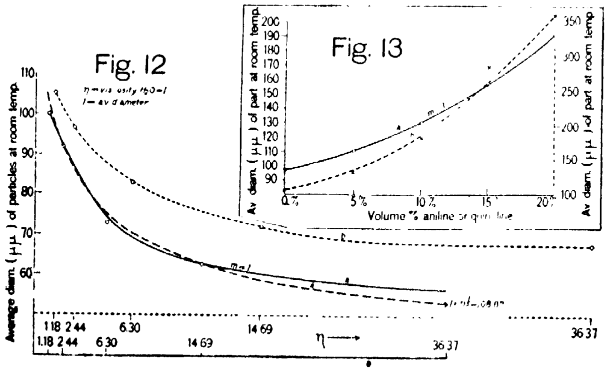

Fig. 13

Fig. 12 η = viscosity H₂O = 1; l = av. diameter

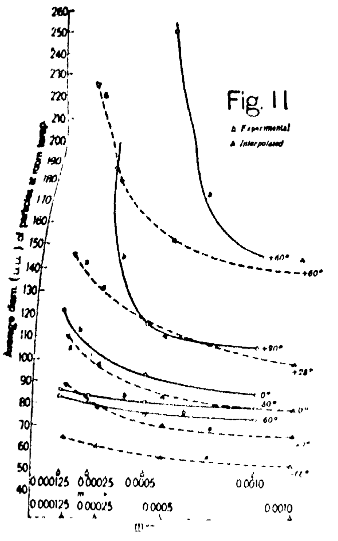

Fig. 11

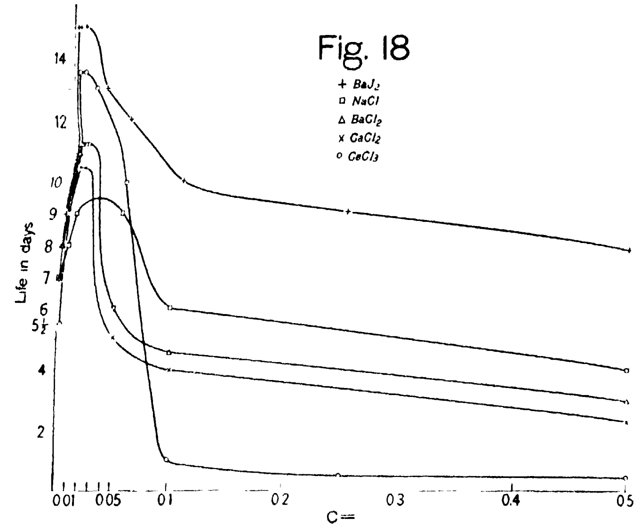

Fig. 18

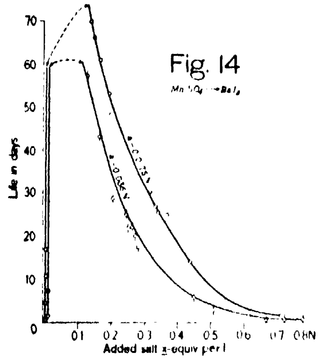

Fig. 14

$MnSO_4 \rightarrow BaI_2$

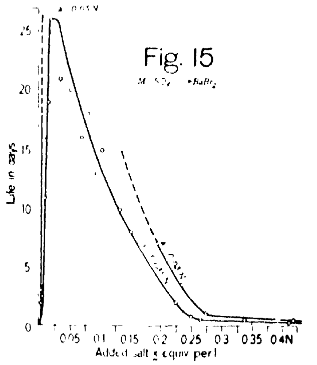

Fig. 15

$MnSO_4 \rightarrow BaBr_2$

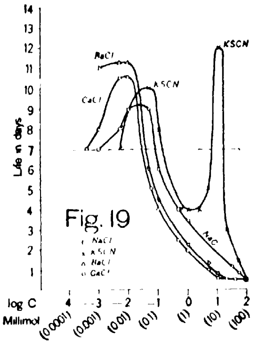

Fig. 19

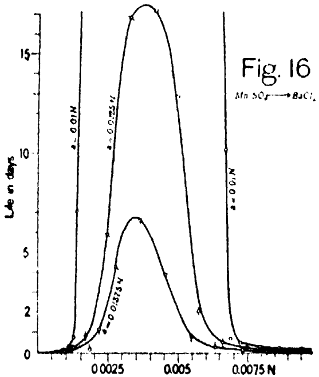

Fig. 16

$MnSO_4 \rightarrow BaCl_2$

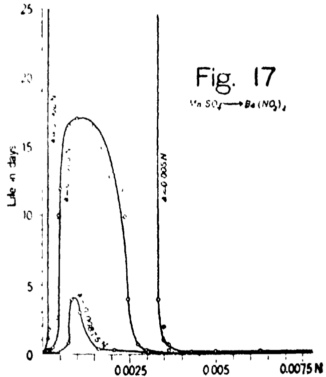

Fig. 17

$MnSO_4 \rightarrow Ba(NO_3)_2$

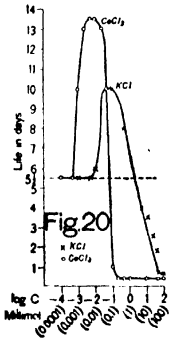

Fig. 20

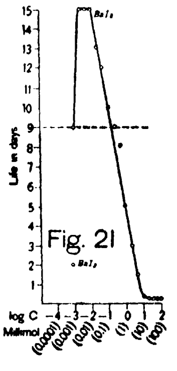

Fig. 21

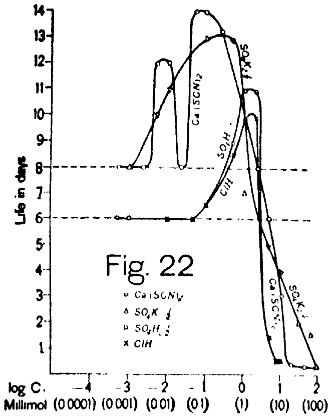
Fig. 22

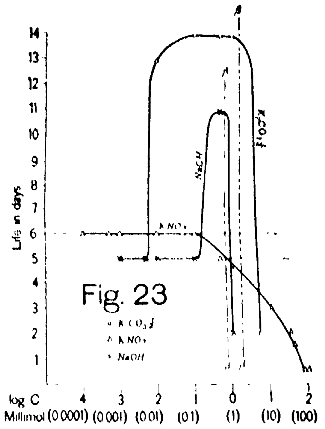
Fig. 23

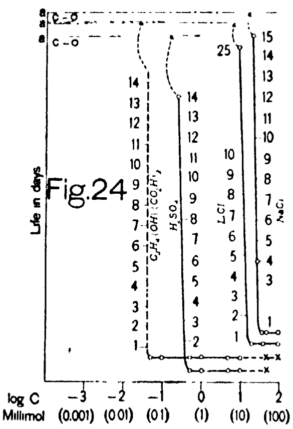
Fig.24

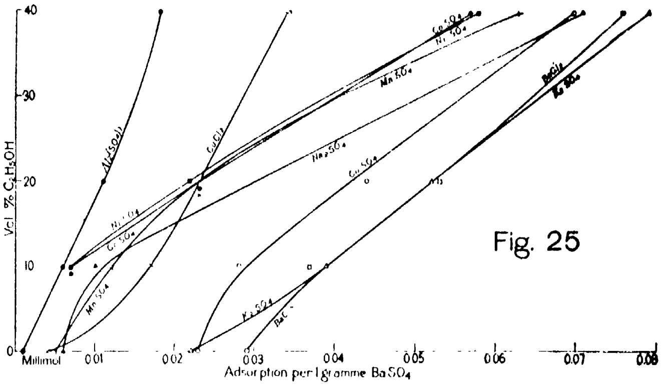
Fig. 25

SWEETENING AGENTS. RELATIVE SWEETENING POWER

C. F. Walton, Jr.

The relative sweetness of various substances is usually cited in comparison with sucrose as unity. Since the concentration of the standard sucrose solution employed by different investigators has varied from 1 to 10%, and since the degree of sweetness does not decrease proportionately with dilution, the values reported in the literature vary accordingly, and are difficult to arrange accurately in numerical order. The following table, therefore, indicates only the approximate degree of sweetness, as reported by different investigators employing a variable procedure.

Relative Degree of Sweetness

(Sucrose = 1.0)

Name	Formula	Degree of sweetness	Lit.
Lactose	$C_{12}H_{22}O_{11}$	0.27–0.28	(26)
Dulcitol	$C_6H_{14}O_6$	0.41	(26)
Mannitol	$C_6H_{14}O_6$	0.45	(26)
Sorbitol	$C_6H_{14}O_6$	0.48	(26)
Glycerol	$C_3H_8O_3$	0.48	(26)
Glycol	$C_2H_6O_2$	0.49	(26)
Dextrose (*d*-glucose)	$C_6H_{12}O_6$	0.50–0.60	(10, 26, 29)
Maltose	$C_{12}H_{22}O_{11}$	0.60	(26, 29)

RELATIVE DEGREE OF SWEETNESS.—(*Continued*)

Name	Formula	Degree of sweetness	Lit.
Invert sugar (dextrose + levulose)	$C_6H_{12}O_6 + C_6H_{12}O_6$	0 78–0.95	(10, 26, 29)
Sucrose	$C_{12}H_{22}O_{11}$	1 00	(10, 26, 29)
Levulose (*d*-fructose)	$C_6H_{12}O_6$	1 03–1.50	(10, 26, 29)
p-Anisylurea	$CH_3OC_6H_4NHCONH_2$	18	(5)
Chloroform	$CHCl_3$	40	(31)
Glucin	Mixture	100	(11)
p-Methylsaccharin	$CH_3C_6H_3COSO_2NH$	200	(19)
Dulcin (*p*-phenetylurea)	$C_2H_5OC_6H_4NHCONH_2$	70–350	(11, 26)
6-Chlorosaccharin	$ClC_6H_3COSO_2NH$	100–350	(19)
n-Hexylchloromalonamid	$n\text{-}C_6H_{13}CCl(CONH_2)_2$	300	(11)
Saccharin (*o*-benzosulfonimid)	$C_6H_4COSO_2NH$	200–700	(11, 26)
Perillaldehyde α-anti-aldoxime (peryllartine)	$C_6H_8C(CH_3)CH_2CHNOH$	2000	(16)

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(For a key to the periodicals see end of volume)

The following list contains certain general references on methods of testing relative sweetening power, etc.

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(10) Deerr, *275*, **24**: 481; 22. (11) Dox and Houston, *1*, **46**: 1278; 24. (12) Dyson, *276*, **11**: 572; 24. (13) Foerster, *282*, **28**: 400; 11. (14) Fränkel, Arzneimittelsynthese (Springer, Berlin, 1921): 134–53. (15) Furukawa, Japanese Patent 35332; 19. (16) Furukawa, *41*, **41**: 706, 979; 20 (17) Hermann, *13*, **429**: 163; 22. (18) Holleman, *70*, **40**: 446; 21. (19) Holleman, *70*, **42**: 839; 23.

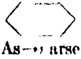
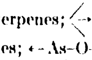
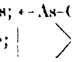
(20) Holleman and Choufoer, *64V*, **33**: 307; 24. (21) Kionka and Strätz, *277*, **95**: 241; 22. (22) Kodama, *41*, **41**: 495; 20. (23) Lasarev, *278*, **194**: 293; 22. (24) Oertley and Myers, *1*, **41**: 855; 19. (25) Ogilvie, *275*, **24**: 288, 22. (26) Paul, *279*, **43**: 137; 22. (27) Paul, *280*, **26**: 610; 22. (28) Pauli, *205*, **125**: 97; 21. (29) Sale and Skinner, *45*, **14**: 522; 22.

(30) Speckam, *273*, **32**: 83; 22. (31) Sternberg, *281*, **36**: 272; 05. (32) Zuntz, *98*, **23**: 385; 10.

ODORIFEROUS MATERIALS

H. ZWAARDEMAKER

The unit used for expressing odor is the *olfacty*, the normal stimulus threshold for a given odor.

The characteristic grouping giving rise to odor is termed odoriphore (8), also called aromatophore (Klimout, 1897) and osmophore (Rupe, 1900). The principal **odoriphores** are: ←C(:O)O-Alkyl, esters; ⇇C(:O)H, aldehydes; ⇇CO, ketones; Alkyl O-Alkyl, ethers; ⇇C=OH, alcohols; ←C(:O)OH, acids; ←NO₂, nitrites; ←CN, nitriles; →,terpenes;  pinenes; ←S–S→, sulfides; ←As–As→, arsenides; ←As–O–As→, cacodyls; ←Hal., halogens; N, pyridine; NH, pyrrole.

CLASSIFICATION

LINNÉ, MODIFIED BY ZWAARDEMAKER

Type	Key letter
Odores aetherei Lorry (Ethereal)	A
Odores aromatici Linné (Aromatic):	
1. Almond	B
2. Camphoric	C
3. Citric	D
Odores fragantes Linné (Balsam):	
1. Floral	E
2. Lilylike	F
3. Vanillin	G
Odores ambrosiae Linné (Musk)	H
Allyl	I
Cacodylic	J
Odores empyreumatic Haller (Empyreumatic)	K
Odores hircini Linné (Caprylic)	L
Odores tetri Linné (Narcotic)	M
Odores nauseosis Linné (Nauseous)	N

Intensity.—The intensity of the odor of an odorivector (5) depends on (1) its volatility from dilute solution, (2) its rate of diffusion, (3) its absorption by a humid surface and (4) its solubility in liquids. (All odorous substances are soluble in oil (2).) The significance of an odor as a reflex stimulus depends on physiological, its pleasing or repulsive value on psychological conditions.

VOLATILITY OF ODOR FROM PARAFFINIC SOLUTIONS (4)

Substance	Concn. per-cent	Volatility 10^{-6} g per min
Ethyl sulfide (I)	1	0.14
Scatole (N)	1	0.18
Valeric acid (L)	0.1	0.28
Guaiacol (K)	1	0.5
Pyridine (M)	10	0.93
Isoamyl acetate (A)	5	3.6
Terpineol (C)	25	7.5
Nitrobenzene (B)	50	9.2

DIFFUSION IN FREE AIR IN NEIGHBORHOOD OF SOURCE (10)

	cc per sec		cc per sec
Eugenol (C)	1.3	Ethyl ether (A)	4.4
Camphor (C)	2 1	Ethylacetone (A)	10

Extremes—ethyl acetate (A) and naphthalene (K). The anemodispersibility of odors depends on the size of the cloud and the velocity of the wind.

Spray Electricity.—All odorous substances lower the surface tension of water and therefore produce static electricity by spraying an aqueous solution of the odorivector against a disc well insulated with amber and paraffin. The value is expressed as 10^{-10} coulomb per cc of a saturated solution.

Substance	10^{-10} coulombs	Lit.
Cumidine (K)	0.2	(12)
Aniline (K)	0.4	(6)
Toluidine (K)	0.4	(6)
Xylidine (K)	0.9	(6)
Scatole (N)	1 0	(12)
Trinitroisobutyltoluene (H)	1	(12)
Pseudocumene (K)	3 4	(2)
Ethyl acetate (A)	3 5	(2)
Xylene (K)	3 8	(6)
Aniline (K)	4 8	(2)
Toluene (K)	5 1	(2)
Thymol (C)	6 5	(2)
Benzene (K)	7 5	(2)
Toluidine (K)	7 9	(2)
Xylidine (K)	9 3	(2)
Nitrobenzene (B)	9 6	(2)
Vanillin (G)	10	(2)
Dimethylaniline (K)	11 6	(6)
Benzaldehyde (B)	12 4	(2)
Anisaldehyde (G)	14 8	(2)
Phenol (K)	15 2	(2)
Xylenol (K)	17	(2)
Ethyl alcohol (A)	17.2	(2)
Cresol (K)	19 1	(12)
Camphor (C)	20.3	(12)
Heliotropin (F)	44	(2)
Vanillin (G)	47	(12)
Heliotropin (F)	52	(12)
Acetone (A)	60	(12)
Guaiacol (K)	81.1	(2)
Carvacrol (C)	82.3	(2)
Terpineol (E)	89.1	(2)
Amyl acetate (A)	96.4	(2)
Ethyl acetate (A)	122	(12)
Guaiacol (K)	289	(12)
Terpineol (E)	296	(12)
Citral (D)	360	(12)
Methyl anthranilate (E)	602	(12)

Relation between Spray Electricity and Concentration of Aqueous Solutions (12)

	Charge in 10^{-10} Coulombs per cc						
Degree of saturation	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{32}$	$\frac{1}{64}$
Coumarin	6 5	2	0 5	0			
Heliotropin	52	22	10	2	1.4	1.4	0
Vanillin	72	32	6	2	0.5	0	

Adsorption of Odors by Surfaces Expressed as the Duration of the After Effect Following an Exposure to a Continuous Stream of Odoriferous Air for 5 Minutes (11). The Term sec Denotes a Few Seconds, m = Minute, d = Day, h = Hour, mn = Some Minutes

	Aluminium	Copper	Glass	Gold	Iron	Lead	Nickel	Porcelain	Silver	Steel	Tin	Zinc
Ethyl disulfide	1 m	sec	sec	sec	sec	1 m	sec	2 m	sec	sec	sec	sec
Guaiacol	15 m	3 m	1 m	12 m	8 m	sec	5 m	5 m	0	7 m	8 m	25 m
Ionone	2 5 d	2 d	sec		4 d	1 d	2 d	sec	sec	4 d	min	
Isoamyl acetate	0	0	0	0	sec	0	sec	15 m	0	2 m	0	sec
Muscon	1 d	4 d	1 d	2 d	mn	12 d	4 9 d	sec	2 d	sec	4 d	3 d
Nitrobenzene	sec	sec	sec	sec	sec	sec	sec	8 m	sec	sec	sec	sec
Pyridine	0	2 m	0	0	45 m	sec	sec	5 m	0	30 m	0.5 m	2.5 m
Scatole	9 d	3 d	1.5 h	1 5 d	10 d	10 d	3 5 d	0	1 d	20 d	7 d	14 d
Terpineol	0	sec	0	0	sec	0	0	5 m	sec	4 m	0	0
Valeric acid	3 m	0	30 m	sec	0	0	sec	0	5 m	0	2 m	0

Destruction of Odors by Ultraviolet Light.—The values are expressed as number of minutes required to reduce the odor in air from 2 to 1 olfacty by the radiation from a quartz mercury lamp (7).

Substance	Time
Apiol (C)	0 10
Valeric acid (L)	0 10
Menthol (C)	0 15
Ethyl sulfide (I)	0.25
Carvacrol (C)	0:25
Bornyl acetate (C)	0.30
Caproic acid (L)	0 30
Methyl salicylate (C)	0 30
Trimethylamine (J)	0 30
Methyl nonyl ketone (C)	0 35
Thymol (C)	0 40
Borneol (C)	0 45
Isoamyl acetate (A)	0 45
Pyridine (M)	0 45
Safrol (C)	0 50
Salicylaldehyde (C)	0 50
Scatole (N)	0 50
Citral (D)	0 55
Indole (N)	1 0
Aniline (K)	1 40
Methyl anthranilate (E)	1 45
Methyl butyrate (A)	2 0
Vanillin (G)	2 0
Citronellol (E)	2.30
Eucalyptol (C)	2 30
Isobutyl alcohol (K)	2 30
Methylheptenone (A)	2.30
Eugenol (C)	3
Styrone (F)	3
Coumarin (G)	3.30
Ethyl isovalerate (A)	4
Cresol (K)	5
Ethyl butyrate (A)	5
Terpineol (E)	5
Chloroform (A)	6
Ethyl succinate	6
Anethol (C)	6.30
Linalyl acetate (D)	7

ODORIMETRY

The olfacty of an odor is the threshold or minimum perceptible concentration expressed in gms per cc which multiplied by $6.06 \times 10^{21}/M$, where M is the molecular weight, gives molecules per cc.

The authorities quoted are: Backman (1); Berthelot (2); Fischer and Peuzoldt (3); Henning (4); Hermanides (5); Huyer (6); Ohma (7); Passy (8); Tempelaar (9); van Wartenberg (10); Zwaardemaker (11).

Compound		Molecules per cc = $A \cdot 10^x$		Authority
Name	Formula	A	x	
Ionone (F)	$C_{13}H_{20}O$	16	5	4
		32	5	9
Ethyl bisulfide (I)	$C_4H_{10}S$	15	6	9
Scatole (N)	C_9H_9N	16	6	5
		18	6	9
Vanillin (G)	$C_8H_8O_3$	20	6	8
Trinitroisobutyltoluene (H)	$C_{11}H_{13}N_3O_6$	21	6	9
Coumarin (G)	$C_9H_6O_2$	33	6	9
Citral (D)	$C_{10}H_{16}O$	40	6	8
Valeric acid (L)	$C_5H_{10}O_2$	47	6	4
Butyric acid (L)	$C_4H_8O_2$	69	6	8
Isoamyl alcohol (K)	$C_5H_{12}O$	69	6	8
Vanillin (G)	$C_8H_8O_3$	72	6	9
Valeric acid (D)	$C_5H_{10}O_2$	12	7	9
Heptylic acid (C)	$C_7H_{14}O_2$	16	7	8
Guaiacol (K)	$C_7H_8O_2$	18	7	5
		20	7	9
Citral (D)	$C_{10}H_{16}O$	20	7	8
Methyl anthranilate (E)	$C_8H_9NO_2$	24	7	9
Nitrobenzene (B)	$C_6H_5NO_2$	32	7	4
Heliotropine (F)	$C_8H_6O_3$	40	7	4
Coumarin (G)	$C_9H_6O_2$	41	7	8
Iodoform	CHI_3	42	7	2
Bromoform	$CHBr_3$	48	7	8
Osmium tetroxide	OsO_4	48	7	10
Oenanthyl alcohol (C)	$C_7H_{16}O$	52	7	8
Valeric acid (D)	$C_5H_{10}O_2$	59	7	8
Cinnamaldehyde (C)	C_9H_8O	64	7	9
Nonylic acid (E)	$C_9H_{18}O_2$	77	7	8
Isobutyl alcohol	$C_4H_{10}O$	82	7	8
Thymol (C)	$C_{10}H_{14}O$	15	8	9
Capric acid (L)	$C_{10}H_{20}O_2$	18	8	8
Heliotropine (F)	$C_8H_6O_3$	20	8	8
Nitrobenzene (B)	$C_6H_5NO_2$	20	8	5
		20	8	9
Borneol (C)	$C_{10}H_{18}O$	20	8	9
Coumarin (G)	$C_9H_6O_2$	21	8	8
Eucalyptol (C)	$C_{10}H_{18}O$	22	8	9
Citral (D)	$C_{10}H_{16}O$	25	8	9
Linalyl acetate (D)	$C_{12}H_{20}O_2$	29	8	9
Lauric acid (C)	$C_{12}H_{24}O_2$	30	8	8
Pyridine (M)	C_5H_5N	31	8	9
Pulegon (M)	$C_{10}H_{16}O$	33	8	9
Eucalyptol (C)	$C_{10}H_{18}O$	39	8	7
Heliotropine (F)	$C_8H_6O_3$	40	8	8
Carvacrol (C)	$C_{10}H_{14}O$	40	8	9
Propionic acid	$C_3H_6O_2$	41	8	8
Durol (K)	$C_{10}H_{14}$	41	8	1
Isoamyl acetate (A)	$C_7H_{14}O_2$	42	8	5
		42	8	9
Safrol (C)	$C_{10}H_{10}O_2$	48	8	7
Citral (D)	$C_{10}H_{16}O$	52	8	7
Anethol (C)	$C_{10}H_{12}O$	57	8	9
Methyl butyrate (A)	$C_5H_{10}O_2$	58	8	9
Terpineol (E)	$C_{10}H_{18}O$	79	8	9
Eugenol (C)	$C_{10}H_{12}O_2$	85	8	7
Pseudocumene (K)	C_9H_{12}	10	9	1
Bornyl acetate (C)	$C_{12}H_{20}O_2$	14	9	9
Methylheptenone (A)	$C_8H_{12}O$	15	9	9
Ethyl butyrate (A)	$C_6H_{12}O_2$	15	9	9
Methyl acetate (A)	$C_3H_6O_2$	16	9	11
Carvone (C)	$C_{10}H_{14}O$	22	9	9
Caproic acid (L)	$C_6H_{12}O_2$	27	9	8
Ethyl succinate (A)	$C_8H_{14}O_4$	28	9	9
Methyl salicylate (C)	$C_8H_8O_3$	39	9	9
Xylene (K)	C_8H_{10}	46	9	1
Cresol (K)	C_7H_8O	50	9	9
Methylnonyl ketone (C)	$C_{11}H_{22}O$	61	9	9
Ethyl ether (A)	$C_4H_{10}O$	61	9	4
Aniline (K)	C_6H_7N	63	9	9
Camphor (C)	$C_{10}H_{16}O$	64	9	8
Amyl alcohol (K)	$C_5H_{12}O$	69	9	8
Safrol (C)	$C_{10}H_{10}O_2$	75	9	9
Phenol (K)	C_6H_6O	77	9	4
Butyl alcohol (K)	$C_4H_{10}O$	82	9	8
Ethyl ether (A)	$C_4H_{10}O$	82	9	8
Fenchone (C)	$C_{10}H_{16}O$	92	9	9
Acetaldehyde (A)	C_2H_4O	96	9	9
Citronellol (E)	$C_{10}H_{20}O$	11	10	9
Valeric acid (L)	$C_5H_{10}O_2$	12	10	5
Toluene (K)	C_7H_8	13	10	1
Ethyl isovalerate (A)	$C_7H_{14}O_2$	21	10	9
Trimethylamine (J)	C_3H_9N	22	10	9
Phenol (K)	C_6H_6O	26	10	9
Benzene (K)	C_6H_6	41	10	1
Acetone (A)	C_3H_6O	42	10	11
Acetic acid (L)	$C_2H_4O_2$	50	10	8
Propyl alcohol (K)	C_3H_8O	51	10	8
Acetic acid (L)	$C_2H_4O_2$	71	10	9
Toluidine (K)	C_7H_9N	79	10	6
Xylidine (K)	$C_8H_{11}N$	10	11	6
Toluidine (K)	C_7H_9N	15	11	6
		16	11	6
Menthol (C)	$C_{10}H_{20}O$	26	11	9
Aniline (K)	C_6H_7N	30	11	6
Formic acid	CH_2O_2	33	11	8
Terpineol (E)	$C_{10}H_{18}O$	73	11	5
Pyridine (M)	C_5H_5N	12	12	5
Ethyl alcohol (A)	C_2H_6O	24	12	4
		33	12	4
Formic acid	CH_2O_2	84	12	9
Methyl alcohol	CH_4O	11	13	9
Methyl alcohol	CH_4O	19	13	8
Apiol (C)	$C_{12}H_{14}O_4$	17	15	9

Value of an Olfacty Expressed as Degree of Saturation of Air with the Odorivector

Substance	% Saturation	Substance	% Saturation
Eucalyptol	0.058	Methyl alcohol	1.388
Eugenol	0.144	Toluidine	1.515
Toluene	0.158	Ethyl alcohol	2.5
Benzene	0.169		

Value of an Olfacty in cm of the Zwaardemaker Olfactometer

The constants of Zwaardemaker olfactometer are: width of cylinder, 0.8 cm; length, 10 cm; contents, 50 cc; air contact per cc of cylinder, 2.5 cm²; velocity of air in the air tube, 100 cc per sec (exposure, 0.33 sec).

Minimum Perceptible in cm of Olfactometer Scale

Saturated solutions (⁹)

Substance	cm	Substance	cm
Terpineol—H_2O	0.01	Caproic acid—H_2O	0.10
Ethyl propionate—H_2O	0.02	Trinitroisobutyltoluene—H_2O	0.10
Ionone—H_2O	0.02	Guaiacol—H_2O	0.20
Camphor—H_2O	0.07	Trimethylamine—Paraffin	0.20

Aqueous solutions (¹⁰)

Substance	Concentration Wt. %	cm
Pyridine	0.05	0.1
Ethyl disulfide	0.02	0.5
Citral	0.01	0.2

Aqueous solutions (¹⁰).—(*Continued*)

Substance	Concentration Wt. %	cm
Scatole	0.01	0.4
Valeric acid	0.01	0.5
Isoamyl acetate	0.01	0.7
Guaiacol	0.0007	1.0

Paraffin solutions (¹¹)

Substance	Concentration Wt. %	cm	Substance	Concentration Wt. %	cm
Borneol	1.0	0.001	Citral	1.0	0.09
Cadaverine	0.1	0.001	Isoamyl acetate	0.5	0.29
Scatole	0.1	0.002	Guaiacol	0.1	0.62
Ethyl sulfide	0.01	0.01	Ionone	0.0004	0.62
Pyridine	1.0	0.03	Safrol	3.0	1.12
Valeric acid	0.01	0.04	Terpineol	2.5	1.60
Nitrobenzene	5.0	0.06			

LITERATURE

(For a key to the periodicals see end of volume)

(¹) Allison and Katz, *44*, **11**: 336; 19. (²) Backman, *278*, **168**: 351; 17. (³) Henning, *Der Geruch*, 1924. (⁴) Hermanides, *Thesis, Utrecht*, 1907. (⁵) Heymnx, *Thesis, Brussels*, 1919. (⁶) Huyer, *Thesis, Utrecht*, 1917. (⁷) Tempelaar, *Thesis, Utrecht*, 1913. (⁸) Zwaardemaker, *Physiol. des Geruchs*, **1895**: 247. (⁹) Zwaardemaker, *Arch. Anat. Physiol., Physiol. Abt.*, **1900**: 48.

(¹⁰) Zwaardemaker, *In* Abderhalden, *Handb. biol. Arbeitsm.* **5**, pt. 7: 455; 28. (¹¹) Zwaardemaker, *In* Tigerstedt, *Handb. Physiol.* **3**, pt. 1: 49; 14. (¹²) Zwaardemaker, *Arch. Neerl. Physiol.*, **1**: 347; 17.

RADIOACTIVITY

S. C. Lind, Special Editor

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1923 INTERNATIONAL TABLE
RADIOACTIVE ELEMENTS AND THEIR CONSTANTS

λ *(sec)*$^{-1}$ is the ***radioactive constant of transformation.***

$$dQ = -\lambda Q dt, \qquad Q = Q_0 e^{-\lambda t}, \qquad \log_{10}\frac{Q_0}{Q} = 0.4343\lambda t,$$

in which Q_0 is the initial quantity and Q the quantity remaining **after a time t** (seconds).

$\lambda = -\frac{dQ}{Q}\frac{1}{dt}$ **represents** the fraction of the element transformed, **reduced to the** unit of time.

In the case of a double transformation, the values between **brackets [ ]** refer to the constants corresponding with the separate **branches**; the constant for both branches not being put between **brackets.**

The sign (?) indicates that the value has been indirectly deduced **from the range** of the α-rays expelled.

$\theta = \frac{1}{\lambda}$ **is the** *average life* of the radioactive atoms.

T is ***the half period,*** *i.e.*, the time in which the quantity of radio-**element is** diminished to one half:

$$\lambda T = -\log_e 0.5 = 0.69315 \text{ and } \theta = 1.443T$$

Radiation.—The brackets ( ) indicate that the radiation is **relatively feeble.**

REMARKS CONCERNING THE NOMENCLATURE

It is desirable that the nomenclature adopted by the international commission should be accepted universally but that now put forward for the present year is provisional, to serve as a basis of discussion with the view to the adoption ultimately of a standard nomenclature.

The most important points are:

1. The three radioactive emanations have been given the names **radon**, actinon, and thoron, with the symbols Rn, An, Tn, to **suggest** both their origin and their chemical character as members of the family of the rare gases of which the valency is zero;
2. In the branches which occur at the C members the sign (′) **has been used** to indicate the products resulting from the emission of β-rays (isotopes of polonium) and the sign (″) to indicate the **products** resulting from the emission of α-rays (isotopes of thallium);
3. The ultimate products have been indicated by the letter Ω.

EXPLANATION OF THE NOTES

Note 1.—*Uranium I.*—The value given for θ is that obtained **from the** equation:

$$\theta = \frac{1}{\lambda} = 2440 \times 0.97 \times 3 \times 10^6 \times \frac{226}{238} = 6.75 \times 10^9$$

in which the number 2440 represents the average life of radium in **years, the number 0.97** the branching coefficient and $3 \times 10^6 \times \frac{226}{238}$ **is the ratio** between the numbers of atoms of uranium and radium **in equilibrium** in minerals.

If the actinium series is independent from that of uranium I, λ cannot be calculated by this method.

The value of λ obtained by the direct counting of the α-particles **from a** compound of uranium is 4.57×10^{-18} from which $\theta = 7 \times 10^9$ years and $T = 4.8 \times 10^9$ years.

Note 2.—*Uranium X_2* is also called brevium.

Note 3.—Radon replaces the names *radium emanation* and ***niton*** (the latter of which was proposed by Sir William Ramsay).

Note 4.—*Radium C* undergoes a double disintegration: 99.97% **of the atoms emit** β-rays and produce the substance Ra-C′ which **gives** α-rays, and 0.03% of the atoms emit α-rays and produce the **substance Ra-C″ which gives** β-**rays.**

a_0 is the *range* in cm of the α-rays in air at 0°C and a pressure of 760 mm of mercury.

The range at τ° C. and under p mm of mercury is

$$a = \frac{a_0(273 + \tau)760}{273p}$$

V is the velocity of α or β-rays relatively to that of light.

To convert to cm per sec multiply by 3×10^{10}.

For the α-rays:

$$V = 0.0342\, a^{1/3}$$

$\mu_{\beta Al}$ is the absorption coefficient of the β-rays in aluminium, the thickness being measured in cm.

$\mu_{\gamma Al}$ and $\mu_{\gamma Pb}$ are the absorption coefficients of the γ-rays in aluminium and lead respectively, the thickness being measured in cm; the latter is only given for the most penetrating type of γ-rays.

If I_0 is the initial intensity and I the intensity after the rays have traversed x cm of the absorbent:

$$I = I_0 e^{-\mu x} \qquad \log_{10}\frac{I_0}{I} = 0.4343\mu x$$

If D is the thickness corresponding with the absorption of one-half of the rays:

$$\mu D = 0.693$$

Note 5.—*Radium D* is also called radiolead.

Note 6.—*Radium C″* is also called radium C_2.

Note 7.—*Uranium Y* is the first known member of the actinium series. It may be derived from Uranium I or Uranium II. In this case, 3% of the atoms of Uranium produce the actinium family, and 97% the radium family.

The hypothesis has also been put forward that the actinium series may be produced independently from a third (hypothetical) isotope of Uranium for which the name actinouranium has been proposed.

Note 8.—*Protoactinium* is also called eka-tantalum.

Note 9.—A new radioactive substance named uranium Z, and isotopic with protoactinium, accompanies uranium in minute quantity. (*25*, **54B**: 1131; 21). Its period is from 6 to 7 hours. It emits a β-radiation for which D_{Al} varies from: 0.0014 to 0.012. Its parent is an isotope of thorium, but it cannot yet be placed in the series.

Note 10.—*Actinon* is also called actinium emanation.

Note 11.—*Actinium C.* 0.2% of the α-rays emitted by this substance have a range $a_0 = 6.10$, instead of 5.12. From this it has been concluded that 0.2% of the atoms undergo a transformation by the emission of β-rays as is the case in the radium C and thorium C branches (*3*, **27**: 690; 14. **28**: 818; 14). Confirmatory evidence appears to be desirable.

Note 12.—*Actinium C″* is also called actinium D.

Note 13.—*Thorium.* The value given for λ is that obtained from the direct counting of the α-particles emitted by a compound of thorium. All the other values are less; the smallest being 0.55 of that given in the table and giving $\theta = 3.45 \times 10^{10}$ years and $T = 2.37 \times 10^{10}$ years (*63*, **19**: 259; 18).

Note 14.—*Thoron* is also called thorium emanation.

Note 15.—*Thorium C* undergoes a double disintegration: 65% of the atoms emit β-rays and produce the substance Th-C′ which gives α-rays, and 35% emit α-rays and produce the substance Th-C″ which gives β-rays.

Note 16.—*Thorium C.* The value $a_0 = 4.69$ is that corresponding with V = 0.0572 which has been directly measured.

Note 17.—*Thorium C″* is also called thorium D.

Note 18.—*Potassium* and ***rubidium*** emit β-rays but show no other evidence of radioactivity.

T	$\theta = \frac{1}{\lambda}$	λ (sec)$^{-1}$	Name	Symbol	Atomic		Isotope	Radiation	a_0	V	μ_β Al	μ_γ Al	μ_γ Pb	Notes
					Wt.	No.								
Series of Uranium and Radium														
4 67 $\times 10^{9}$ yrs	6 75 $\times 10^{9}$ yrs	4.7 $\times 10^{-10}$	Uranium I	U_I	238	92	U	α	2 37	0 0456				1
24 6 days	35.5 days	3 26 $\times 10^{-7}$	Uranium X_1	U-X_1	234	90	Th	β			463			
1 15 min	1.65 min	0.010	Uranium X_2	U-X_2	234	91	Pa	β (γ)			14 4	24; 0 7, 0 14	0 72	2
2 $\times 10^{6}$ yrs	3 $\times 10^{6}$ yrs	10^{-14} (?)	Uranium II	U_{II}	234	92	U	α	2 75	0 0479				
6 9 $\times 10^{4}$ yrs	10^{5} yrs	3.2 $\times 10^{-13}$	Ionium	Io	230	90	Th	α	2 85	0 0485				
1690 yrs	2440 yrs	1 30 $\times 10^{-11}$	Radium	Ra	226	88	Ra	α ($\beta + \gamma$)	3 13	α 0 0500, β 0 52, 0 65	312	354, 16; 0 27		
3 85 days	5 55 days	2 085 $\times 10^{-6}$	Radon	Rn	222	86	Rn	α	3 94	0 0540				3
3 0 min	4.32 min	3 85 $\times 10^{-3}$	Radium A	Ra-A	218	84	Po	α	4 50	0 0565				
26 8 min	38.7 min	4.30 $\times 10^{-4}$	Radium B	Ra-B	214	82	Pb	β (γ)		0 36, 0 41; 0 63, 0 70; 0 74	13 1, 80	230, 40, 0 51		
19 5 min	28 1 min	5 92 $\times 10^{-4}$	Radium C	Ra-C	214	83	Bi	99 97% β and γ		0 780, 0 862, 0 949, 0 957	13 2; 53	0 115	0 50	4
10^{-6} sec	10^{-6} sec	10^{6} (?)	Radium C′	Ra-C′	214	84	Po	α	6 57	0 0641				
16 5 yrs	23 8 yrs	1 33 $\times 10^{-9}$	Radium D	Ra-D	210	82	Pb	(β and γ)		0 33, 0 39	5500	45; 0 99		5
5 0 days	7 2 days	1 61 $\times 10^{-6}$	Radium E	Ra-E	210	83	Bi	β			43 3			
136 days	196 days	5 90 $\times 10^{-8}$	Radium F (Polonium)	Ra-F (Po)	210	84	Po	α (γ)	3 58	0 0523		585		
			Radium Ω (Lead)	Ra Ω′ Pb^{206}	206	82	Pb							
		[1 8 $\times 10^{-7}$]	Radium C	Ra-C	214	83	Bi	0 03% α	?					
1 4 min	2 0 min	8 3 $\times 10^{-3}$	Radium C″	Ra-C″	210	81	Tl	β						6
			Radium Ω″ (hypothetical)	Ra Ω″	210	82	Pb							
Series of Actinium														
			Uranium ?		?	92	U	α						7
1 04 days	1 5 days	7 8 $\times 10^{-6}$	Uranium Y	U-Y	?	90	Th	β			About 300			
1 2 $\times 10^{4}$ yrs	1 7 $\times 10^{4}$ yrs	1 9 $\times 10^{-12}$	Protoactinium	Pa	?	91	Pa	α	3 314	0 0510				8, 9
20 yrs	28 8 yrs	1 1 $\times 10^{-9}$	Actinium	Ac	?	89	Ac							
19 5 days	28.1 days	4 11 $\times 10^{-7}$	Radioactinium	Rd-Ac	?	90	Th	α (β)	4 36	α 0 0559; β 0 38, 0 43, 0 49, 0 53, 0 60, 0.67; 0 73	About 170	25, 0 19		
11 4 days	16 4 days	7 06 $\times 10^{-7}$	Actinium X	Ac-X	?	88	Ra	α	4 17	0 0550				
3 9 sec	5 6 sec	0 178	Actinon	An	?	86	Rn	α	5 40	0 0600				10
2 0 $\times 10^{-3}$ sec	2 9 $\times 10^{-3}$ sec	345	Actinium A	Ac-A	?	84	Po	α	6 16	0 0627				
36 1 min	52 1 min	3 2 $\times 10^{-4}$	Actinium B	Ac-B	?	82	Pb	(β and γ)			Very large	120; 31; 0.45		11
2 15 min	3 10 min	5 37 $\times 10^{-3}$	Actinium C	Ac C	?	83	Bi	α	5 12	0 0589				
4 71 min	6 83 min	2 44 $\times 10^{-3}$	Actinium C″	Ac-C″	?	81	Tl	β and γ			28 5	0.198	1.2 to 1 8	12
			Actinium Ω″ (hypothetical)	Ac Ω″	?	82	Pb							
Series of Thorium														
1 31 $\times 10^{10}$ yrs	1.89 $\times 10^{10}$ yrs	1 68 $\times 10^{-18}$	Thorium	Th	232	90	Th	α	2 58	0 0469				13
6.7 yrs	9 67 yrs	3 28 $\times 10^{-9}$	Mesothorium 1	Ms-Th1	228	88	Ra							
6 2 hrs	8 9 hrs	3 12 $\times 10^{-5}$	Mesothorium 2	Ms-Th2	228	89	Ac	β and γ		0 37, 0 39, 0 43; 0 50; 0 57; 0 60; 0 66 and $>$0 70	20 2 to 38 5	26; 0 116	0 62	
2 02 yrs	2 91 yrs	1 09 $\times 10^{-8}$	Radiothorium	Rd-Th	228	90	Th	α (β)	3 67	α 0 0527; β 0 47; 0 51				
3 64 days	5 25 days	2 20 $\times 10^{-6}$	Thorium X	Th-X	224	88	Ra	α	4 08	0.0546				
54 sec	78 sec	0 0128	Thoron	Tn	220	86	Rn	α	4 74	0.574				14
0 14 sec	0 20 sec	5.0	Thorium A	Th-A	216	84	Po	α	5 40	0 0600				
10 6 hrs	15 3 hrs	1 82 $\times 10^{-5}$	Thorium B	Th-B	212	82	Pb	β and γ		0 63; 0 72	110	160; 32; 0 36		
60 min	87 min	1 92 $\times 10^{-4}$	Thorium C	Th-C	212	83	Bi	65% β		(C + C″) 0 29, 0 36; 0 93 to 0 95	14 4			15
10^{-11} sec	10^{-11} sec	1.25 $\times 10^{-4}$	Thorium C′	Th-C′	212	84	Po	α	8 16	0 0688				
		10^{11} (?)	Thorium Ω′ (Lead)	Th Ω′ Pb^{208}	208	82	Pb							
		[6.7 $\times 10^{-5}$]	Thorium C	Th-C	212	83	Bi	35% α	4 55 ?4 69	0 0572				16
3 1 min	4 5 min	3 70 $\times 10^{-3}$	Thorium C″	Th-C″	208	81	Tl	β and γ		(See Th-C)	21 6	0 096	0 46	17
			Thorium Ω″ (Lead)	Th Ω″ Pb^{208}	208	82	Pb							
			Potassium	K	39 1	19	K	β			22 to 38			18
			Rubidium	Rb	85 5	37	Rb	β			308 to 347			

PHYSICAL PROPERTIES OF THE RADIOELEMENTS AND THEIR COMPOUNDS
(Except Ra, Th, U and Rn)

Georg Hevesy

1. Atomic Weights.—Io (mixture of Io + Th), 231.51 (2). RaΩ (= U-Pb), 206.04 (3). ThΩ (= Th-Pb), 207.97.

2. Molecular Weights.—An (= Ac-Em), 220–232 (4). Tn (= Th-Em), 201–210 (4). Rate of effusion method.

3. Density (5).—RaΩ, 11.273 g cm^{-3} at 19.94°C.

4. Melting Point (26).—RaΩ′, differs from Pb <0.05°.

5. Boiling Point (32).—Ra-FH$_2$, 37°C.

6. Solubility.—S = solubility mol l^{-1}. $\alpha' = \frac{C_{\text{Air}}}{C_{H_2O}}$. An (14), α' = 2 at 18°. Tn (15), α' = 1 at 18°. Rn (16). S = 1.7989 (15b) in H$_2$O at 25°. S [RaΩ′(NO$_3$)$_2$] − S[Pb(NO$_3$)$_2$] < 10^{-4}.

Relative Solubility of An in Different Solvents at 18°

H_2O	Sat. KCl soln.	Conc. H_2SO_4	C_2H_5OH	$C_5H_{11}OH$	C_6H_5CHO	C_6H_6	$C_6H_5CH_3$	Kerosene	CS_2
1	0.9	0.95	1.11	1.6	1.7	1.7	1.8	1.9	2.1

7. Rate of Solution.

Percent Dissolved from Surface at 18°

By H$_2$SO$_4$ in 15 sec (17)

H$_2$SO$_4$, equiv. per liter =	10^{-3}	10^{-2}	10^{-1}	1
Ra-B from glass	80	80	97	88
Ra-C from glass	28	60	88	99

By HNO$_3$ in 60 sec (18)

HNO$_3$, equiv. per liter =	0	10^{-5}	10^{-4}	10^{-3}	10^{-2}	10^{-1}	1
Th-B from quartz	60	61	60	80	81	83	84
Th-C from quartz	37	38	35	61	72	77	87

Percent Ra-B and Ra-C Dissolved from Glass Surface (17)

By H$_2$O in 5 min

t	Ra-B	Ra-C	t	Ra-B	Ra-C
0°	0.29	0.19	42°	0.78	0.67
17°	0.47	0.35	70°	0.97	0.91

By H$_2$SO$_4$ in 15 sec

t	Ra-B	Ra-C	t	Ra-B	Ra-C
0°	0.74	0.52	42°	0.895	0.71
17°	0.80	0.60	70°	0.96	0.81

8. Adsorption.—Ratio of molal conc. in gas at equilibrium to moles adsorbed per liter of charcoal at 18°, An (19) 0.05, Tn (20) 0.02. Percent of initial amount present (per 50 cc of solution) adsorbed by 1 g of adsorbent (21). (*a*) By BaSO$_4$, from 0.1 *N* HCl, Th-B 81, Th-C 32; from 0.1 *N* KOH, Th-B 20, Th-C 64; from 0.1 *N* NH$_3$, Th-B 100, Th-C 86. (*b*) By Cr$_2$O$_3$, from 0.1 *N* HCl, Th-B 2.5, Th-C 69. (*c*) By AgBr, from 0.1 *N* HBr, Th-B 81, Th-C 34. (*d*) By BaSO$_4$, from 1 *N* HCl, Ra 80. (*e*) By Cr$_2$O$_3$, from 1 *N* HCl, Ra 0. (*f*) By AgCl, from 1 *N* HCl, Ra 0.

9. Vapor Pressure.—$p_{700°}$ for RaΩ′ is 2% greater than for Pb (22).

10. Temperature of Volatilization.—Depends on nature of surface and chemical state of the radioactive element. *v.* (23, 24, 25).

11. Coefficient of Diffusion.

(*a*) In Gases at 76 cm and 15°

An, in	Air	H$_2$		CO$_2$	SO$_2$	A
Δ, cm^2 sec^{-1}.	0.098–0.123 (6, 7, 8, 9)	0.330 (7)	0.412 (8)	0.075 (7, 8)	0.062 (7)	0.107 (7)

Tn, in	Air	A
Δ, cm^2 sec^{-1}.	0.085–0.103 (6, 7, 9)	0.084 (7)

(*b*) The Cations in Water (10) at 18°

Ion	UX_1^{++++}	Io^{++++}	Ra-D^{++}	Ra-E^{+++}	Ra-F^{++}	Ac^{+++}
Δ, cm^{-2} day^{-1}	0.4	0.33	0.65	0.45	0.76	0.46

Ion	AcX^{++}	Rd-Th^{++++}	ThX^{++}	Th-B^{++}	Th-C^{+++}
Δ, cm^{-2} day^{-1}.	0.69	0.33	0.66	0.67	0.5

Th-CCl$_3$ in $\frac{1}{12}$ *N* NH$_3$, Δ = 0.37. Ra-FCl$_2$ in $\frac{1}{2}$ *N* NH$_3$, Δ = 0.19.

(*c*) In Metals. Δ in cm^{-2} Day^{-1}

	t	Δ
Th-B in Pb	343°	2.2 (11)
Ra-D in Pb	280°	<10^{-4} (12)
Ra-F in Pb	280°	<10^{-4} (12)
Ra-F in Au	470°	*ca.* 10^{-9} (13)
Ra-B + Ra-C in Ag	470°	3.8 × 10^{-7} (13)
Ra-B in Au	470°	8.2 × 10^{-7}
Ra-B in Pt	470°	3.4 × 10^{-7}

In re diffusion of Th-B in single crystals, in lead foils and in thallium foils *v.* (35).

12. Refractive Index (27).—$n_D^{25°}$ for cryst. RaΩ′(NO$_3$)$_2$ = 1.7814.

13. X-ray Spectra.—All lines of the L series and the M$_\alpha$ and M$_\beta$ lines of RaΩ′ differ by less than 5 × 10^{-12} cm from the same lines for Pb (28).

14. Relative Ionic Mobilities (10).—In capillary tubes by comparison against Ra (Λ = 57.3 mhos).

Cation	Ra	Ra-C	Ra-D	Ra-E	Ra-F	AcX	ThX	Th-B	Th-C
Λ	57.3	54.5	61.9	61.9	68.8	56.1	58.0	55.4	54.0

15. Emf.—RaΩ′ / *N* RaΩ′(NO$_3$)$_2$ // *N* Pb(NO$_3$)$_2$ / Pb. <0.1 millivolt (31).

16. Deposition Voltage.—From $\frac{1}{10}$ *N* HNO$_3$ containing 10^{-8} mole Ra-F, cathodic deposition occurs on Au electrodes at E_{Hg} = 0.35 volt, anodic at E_{Hg} = 1.05 volt (30).

LITERATURE AND REMARKS

(For the key to periodicals see end of volume)

(1) Hönigschmid, *9*, **22**: 21; 16. This mixture contained about 30% Io and 70% Th and was probably contaminated with some Th not present in the pure pitchblende (*cf.* Soddy and Hitchins, *3*, **47**: 1148; 24. Meyer and Ulrich, *75*, **132**: 279; 23). (2) Lowest value found. Higher values probably due to presence of lead. Richards and Lembert, *1*, **36**: 1329; 14. *93*, **88**: 429; 14. Hönigschmid and Horowitz, *75*, **123**: 2407; 14. *9*, **20**: 319; 14. Curie, *34*, **148**: 1676; 14. *198*, **34**: 586; 23. Richards, *Ann. Rep. Smithsonian Inst.* **1918**: 205. Richards and Putzeys, *1*, **45**: 2954; 23. (3) Highest value found. Lower values probably due to presence of lead and RaΩ. Hönigschmid, *9*, **26**: 91; 19. Soddy, *4*, **105**: 1402; 14. *58*, **94**: 615; 15. **98**: 469; 17. **99**: 244; 17. (4) Leslie, *4*, **24**: 637; 12. *34*,

153: 328; 11. Marsden and Wood, 4, [illegible]: 948; 13. (5) Richards and Wadsworth, *1*, **38**: 221, 1658; 16. *Cf.* Soddy, *58*, **107**: 41; 21 Egerton and Lee, *5*, **103**: 487; 23. (6) Rutherford, "*Radioactivity*," Cambridge, 1913, p 387. (7) Russ, *4*, **17**: 540; 09. (8) B Bruhat, *199*, **6**: 67, 09 *Cf* Debierne, *199*, **4**: 213; 07. McLennan, *2*, **30**: 660; 10. Eckmann, *200*, **9**: 177; 12. Thomsen, *201*, **18**: 377; 09. Hevesy, *200*, **10**: 198; 13. (9) Leslie, *34*, **153**: 328; 11. Rutherford, *l c.*

(10) Hevesy, *63*, **14**: 49, 1202; 13. *4*, **26**: 586; 14. Paneth, *75*, **122**: 1636, 13. The radioelements probably present in colloidal state. (11) Gróh and Hevesy, *8*, **63**: 85; 20. Diffusion rate of a mixture of Th-B and Pb in lead. Th-B used as indicator. (12) Gróh and Hevesy, *8*, **65**: 216, 21. Diffusion rate of a mixture of Ra-D and Pb in lead (13) Wertenstein and Dobrowolska, *51*, **4**: 324; 23. Diffusion rate of active deposit (probably of oxides). (14) Hevesy, *63*, **12**: 1214; 11. *50*, **16**: 429, 12 (15) Klaus, *63*, **6**: 820; 05. Boyle, *Macdonald Phys Build. Bull*, No **1**: 52, 10. α of short-lived An and Tn determined by making assumptions only partly justified. α of An and Tn probably practically identical with that of Rn. (16) Richards and Schumb, *1*, **40**: 1403; 18. The RaG′ used contained some common lead, its atomic weight being 206 34 The solubility of common lead (at. wt. 207.19) was found by the same authors to be 1 7993 *Cf.* Fajans and Lembert, *98*, **95**: 297; 16. (17) Ramstedt, *147*, II· No. **31**; 13. *Cf.* Arrhenius, *199*, **7**: 228, 10 Godlewski, *199*, **10**: 250; 13. Schräder, *4*, **24**: 131; 12. Hevesy, *9*, **19**: 291; 13 (18) Hevesy and Rona, *7*, **89**: 294; 15. *In re* Ra-F, *cf* Paneth and Hevesy, *75*, **123**: 1050; 13. (19) Hevesy, *63*, **12**: 9; 12. *50*, **18**: 429; 12

(20) Boyle, *4*, **17**: 389; 09. Ra-B and Th-B between Pb amalgam and $Hg(NO_3)_2$; *cf. Z.* Klemensiewicz, *34*, **158**: 1889; 14. (21) Paneth, *63*, **15**: 924, 14 Horowitz and Paneth, *75*, **129**: 1810, 14 *In re* adsorption UX *cf.* Ebler and Rhyn, *25*: **84**: 2896, 21 A C Brown, *4*, **121**: 1738; 22. Freundlich and Wreschner, *7*, **106**: 360; 23. Adsorption of Ra-B, Ra-C, Th-B and Th-C Hevesy, *75*, **127**: 1787, 18 Cranston and Burnett, *4*, **119**: 2036; 21 **121**: 2890, 22 Paneth and Vorwerk, *7*, **101**: 415; 22. Fajans and Frankenburg, *7*, **105**: 255, 23 Absorption of Ra-F, Paneth, *55*, **18**: 1, 288; 13 Lachs and Werthenstein, *63*, **23**: 318; 22 Escher, *34*, **177**: 3, 172; 23 (22) Egerton, *5*, **103**: 469; 23 (23) Russell, *4*, **24**: 134; 12. *cf.* Schräder, *4*, **24**: 125, 12. (24) St Lorna, *63*, **17**: 6, 16 (25) Wood, *5*, **91**: 543, 15 *Cf* Barrat and Wood, *67*, **26**: 248; 14 Wood, *4*, **28**: 808; 14. *In re* volatilization of Tn *cf* Fleck, *4*, **29**: 337; 15 and St Lorna, *75*, **129**: 829; 15 Volatilization of RaFH₃ and of the hydrides of Ra-B, Th-B and Th-C, Paneth, *25*, **51**: 1704, 18 **53**: 1693, 20. *9*, **26**: 452; 20. (26) Richards and Hall, *1*, **42**: 1550, 20 *cf* Lembert, *9*, **26**: 59, 20. (27) Richards and Schumb, *1*, **40**: 1403; 18 For $Pb(NO_3)_2$, $n_D^{20} = 1.7815$. (28) Siegbahn and Stenstrom, *63*, **18**: 547, 17. *Cf* Duane and Shimizu, *197*, **6**: 198; 19 Cooksey and Cooksey, *2*, **16**: 327; 20. *In re* slight difference in the wave length of optical spectrum of ordinary Pb and mixtures of RaG and ordinary Pb, *cf* Aronberg, *197*, **3**: 710; 17. *81*, **47**: 96; 18. Harkins and Aronberg, *1*, **42**: 1328; 20. Merton, *5*, **99**: 87; 21. **100**: 84, 21 (29) Hevesy, *4*, **26**: 410; 13 *63*, **14**: 49; 13.

(30) Hevesy and Paneth, *75*, **123**: 161; 14. Meitner, *63*, **12**: 1094; 11. Hevesy, *4*, **23**. 628, 12 Wertensteinowa, *256*, **10**: No 6, 771; 17. On the deposition of Th-B and Ra-E, Paneth and Hevesy, *75*, **122**: 1037; 13. (31) Hevesy and Paneth, *75*, **124**: 381, 15 (32) Paneth, *l c* (33) Fajans and Lembert, *98*, **95**: 297, 16 (34) Richards and Schumb, *l c.* (35) Hevesy and Obrutsheva, *58*, **115**: 674, 25.

ARTIFICIAL DISINTEGRATION OF THE ELEMENTS

G. Rudorf

Disintegration by the splitting off of positively charged hydrogen nuclei by the action of rapidly moving α-particles.

(*a*) Disintegration obtained with B, N, F, Ne, Na, Mg, Al, Si, P, S, Cl, A, K (1, 2, 3, 5).

(*b*) No disintegration obtained with H, He, Li, C, O, Ni, Cu, Zn, Se, Kr, Mo, Pd, Ag, Sn, X, Au, U (2, 3, 5).

(*c*) Doubtful, Be (4, 5).

Range of Emitted Hydrogen Nuclei (2, 3, 5)

Element	Forward range in cms	Backward range in cms
B	58	38
N	40	18
F	65	48
Na	58	36
Al	90	67
P	65	49
Mg, Si, S, Cl, A, K	18–30	
Ne	16	

The values for B, F, Na, P are possibly somewhat in error (2) but are certainly greater than 40 (2).

LITERATURE

(For a key to the periodicals see end of volume)

(1) Rutherford, *3*, **37**: 581; 19 *5*, **97**: 374; 20 (2) Rutherford and Chadwick, *3*, **42**: 809; 21 (3) Rutherford and Chadwick, *3*, **44**: 417, 22, also Rutherford, *4*, **121**: 400; 22. (4) Kirsch and Petterson, *75*, **132**: 299, 21 *3*, **47**: 500; 24. (5) Rutherford and Chadwick, *67*, **36**: 417; 24

ELECTRON EMISSION PRODUCED BY RADIATION FROM RADIOACTIVE SUBSTANCES

Pierre Auger

Relative Ionization of Gases by Po α-Rays Having a 3.8 cm Range(1)

Gas	Air	O_2	N_2	CO_2	Illuminating gas
I	1	1 12	0 97	1 23	0 38

Relative Molecular Ionization of Gases by β and γ Rays (2)

Gas	Air	H_2	O_2	NH_3	N_2O	CO_2	C_2N_2	SO_2	CS_2	C_5H_{12}
$I\beta$	1	0.16	1.17	0 89	1.55	1.60	1 86	2 25	3 62	4 55
$I\gamma$	1	.16	1 16	90	1 55	1.58	1 71	2 27	3 66	4 53

Gas	C_6H_6	CH_3OH	CH_3Br	$CHCl_3$	CH_3I	CCl_4	C_2H_4O
$I\beta$	3.95	1.69	3 73	4 94	5.11	6 28	2 12
$I\gamma$	3.94	1 75	3 81	4 93	5.37	6 33	2 17

Gas	C_2H_5Cl	C_2H_5Br	C_2H_5I	$(C_2H_5)_2O$	$Ni(CO)_4$
$I\beta$	3.24	4.41	4.39	5.90	
$I\gamma$	3 19	4 63	4.29	6.47	5 98

Residual Ionization as Dependent on the Pressure

Ionization from the walls (a secondary radiation) in air confined for 10 days. N_I = number of ions per cm³ per sec (3).

P. atm.	0	10	20	27	40	46	50	60
N_I	0	17	30	38	46	50	50	50

Number of Electrons (δ-rays) Liberated by α-rays

l = thickness of metal traversed. N_E = electrons emitted per incident particle (4).

$10^5\, l$ (g cm⁻²)	In Al							In Ag		In Au	
	81	162	243	324	410	492	570	28.5	591	12.3	1223
N_E	11 9	14 2	15 0	17 2	17 8	18 9	19 4	8.12	13.76	9.82	18.16

Pairs of Ions Produced by α-rays

If R_0 cms is the range of the α-particle in air, it will produce *n* pairs of ions. $n = n_0 R_0^{2/3}$, where $n_0 = 6.233 \times 10^4$. Direct measurement for Ra-C′ gives $n = 2.20 \times 10^5$ (5).

Energy

Energy of electrons (Sec. β-rays) emitted by metals subjected to the action of γ-rays from Ra(C + E). Three groups of rays (6).

Metal	Pb	Pt	W	U	Ba
Atomic number	82	78	74	92	56
Energy of the secondary rays. Volts × 10⁻⁵.	1.49 2.03 2 60	1.58 2.12 2.69	1 66 2.20 2 76	1.22 1.74 2.31	2.53

SECONDARY β-RAY VELOCITIES

Pb subjected to the action of γ-rays from Ra-B has been found to emit the following secondary β-rays:

$RH = \frac{mu^2}{e(1-\beta^2)} = 3610$, 3250, 2990, 2735, 2225, 2130, 2000, 1935, 1825, 1750, 1620, 1560, 1400, 1240, 1150, 1010, 950, 820, 800 (⁸).

ABSORPTION

Absorption of the secondary β-rays emitted by metals when subjected to the radiation from Ra(B + C). μ_h for the hard rays, μ_s for the soft rays. Absorbing screen, Al (⁷).

Metal	Ag	Al	Au	Cu	Fe	Ni	Pb
μ_h, cm^{-1}	69	14	118	35	41	52	118
μ_s, cm^{-1}	207	52.5	345	105	165	165	345

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(For a key to the periodicals see end of volume)

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ENERGY OF RADIOACTIVE PROCESSES

STEFAN MEYER

HEAT PRODUCTION OF RADIOACTIVE SUBSTANCES

Joules per hour per gram of the radioactive element and the decay products in equilibrium therewith. (1 Joule = 0.2390 g-cal.)

Substance	Rays	Meyer & Hess(⁴)	Hess(²)	Rutherford & Robinson (⁷)
Ra	α and recoil	573	105 5	
Rn	α and recoil		467 7	105 0
Ra-A	α and recoil			119 7
Ra-B + Ra-C	α and recoil			127 6
	and β, γ			211 3
Total		573	573	565

Substance	Heat	Lit.
Th	10.0×10^{-5}	(⁵)
U	$4\ 2 \times 10^{-4}$	(⁶)
Pitchblende (*ca.* 64% U)	$27\ 2 \times 10^{-5}$	(⁶)

Ellis and Wooster (¹) have determined the γ-heat effect of Ra-B to be 3.6; Ra-C, 32.2; total, 36 joules/h. Calculations of the heat effect of β-α and γ-rays have been made by Meitner (³) and Thibaud (⁸).

LITERATURE

(For a key to the periodicals see end of volume)

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CHEMICAL EFFECTS OF α-PARTICLES

S. C. LIND AND D. C. BARDWELL

M is the total number of molecules reacting (on the left hand of the equation, first column); N is the total number of ion pairs produced in the reactants by α-particles.

$$\frac{M}{N} = \frac{\left(\frac{k_\mu}{\lambda}\right)' \cdot V}{D \cdot F \cdot G \cdot H} \times 1.66 \times 10^3$$

V = volume in cm³ of, and D = diameter in cm of, the reaction sphere.

F = average intensity of ionization (¹). G = specific molecular ionization (air = 1).

$H = (\alpha + R)/\alpha$ where α and R are α-ray and recoil atom effects resp. (²).

$$\left(\frac{k\mu}{\lambda}\right)' = \left(ln\frac{P_1}{P_2}\right) + [E_o(e^{-\lambda t_1} - e^{-\lambda t_2})] \quad (^3)$$

where E_o = initial radon (in curies), P = pressure (mm Hg), λ = decay constant of radon (in reciprocal days) and t = time (in days).

Where the quantity of gas in the reaction vessel at atmospheric pressure exceeds the air equivalent of a bulb 2.5 cm in diameter, the ionization is calculated by equations developed by W. Mund (¹⁷), slightly modified:[1]

$$I = N_0(1-e^{-\lambda t})k\Big[r^{2/3} + \frac{1}{2}r'^{2/3} + \frac{1}{2}r''^{2/3} - \frac{3}{20R}\Big\{3r^{5/3} + r'^{5/3} + r''^{5/3} - 3(r-2R)^{5/3} - (r'-2R)^{5/3} - (r''-2R)^{5/3}\Big\} + \frac{81r^{11/3}}{3520R^3} - \frac{27}{160}(r-2R)^{5/3}\Big\{\Big(\frac{r-2R}{R}\Big)^2 + \frac{3}{22}\Big(\frac{r-2R}{R}\Big)^3\Big\}\Big]$$

I = Number of ions produced by the three sets of α-particles in the time t.

N_2 = Number of atoms of radon present initially (t = 0) (1 curie = 1.772 × 10¹⁶ atoms Rn)

R = Radius of reaction bulb in cms.

λ = Decay constant of radon (as above)

$k = 6.67 \times 10^4 \frac{\text{ions}}{\text{cm}^{2/3}}$ = ionization constant per α-particle as a function of the range (5); $i = kr^{2/3}$ or $kr'^{2/3}$ or $kr''^{2/3}$ for Rn, Ra-A, and Ra-C, resp. (air at 760 mm and 0°C)

r, r', r'' = ranges of α-particles from Rn, Ra-A, and Ra-C, resp. Wourtzel's (¹³) M/N values are recalculated by the Mund equation

The values adopted for the number of α-particles per sec per g of radium, and the total ions from one α-particle of Ra-C in its completed path in air are respectively, for column (*a*) 3.72 × 10¹⁰ (⁴) and 2.37 × 10⁵ (⁵), and for (*b*) 3.40 × 10¹⁰ (⁶, ⁷) and 2.20 × 10⁵ (⁸). Other combinations of these numbers give intermediate values of M/N.

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[1] The modified equation is derived by correcting the integration of Mund's function $\varphi(r) = \int_0^{2R}(r-x)^{2/3}x^2dx$ (equation 5, p. 340). In the large bulbs used by Mund no error was introduced by employing his equation since $2R>r$.

Reaction l = liquid, g = gas, s = solid		$\frac{M}{N}$ (a)	$\frac{M}{N}$ (b)	Lit.
$2H_2g + O_2g \rightarrow 2H_2Ol$		5.13	6.05	(9, 10)
Dry or moist; at 25°C to −75°C				
$2H_2Ol \rightarrow 2H_2g + O_2g$		0.86	1.01	(11)
		1.05	1.24	(11)
$2H_2Og \rightarrow 2H_2g + O_2g$		<0.01	<0.01	(11)
$2H_2Os \rightarrow 2H_2g + O_2g$		0.05	0.06	(11)
$CO_2g \rightarrow$ 1% disappearance of gas, no decomposition products		5×10^{-3}	6×10^{-3}	(18)
$COg \rightarrow CO_2g + C_nO_ms + Cs$		1.85	2.18	(18)
$2COg + O_2g \rightarrow 2CO_2g$ at room temperature		5.7	6.7	(18)
$2COg + O_2g \rightarrow 2CO_2s$ at liquid air temp.		>3.1	>3.7	(18)
$COg + H_2g \rightarrow$ carbohydrate s		3.13	3.7	(18)
$CO_2g + H_2g \rightarrow$ carbohydrate $s + H_2Ol$		1.44	1.70	(18)
$CO_2g + CH_4g \rightarrow$ carbohydrate $s + H_2Ol$		0.76	0.90	(10)
$CH_4g \rightarrow H_2g$ + hydrocarbons g,l and s		2.0	2.4	(10)
$C_2H_6g \rightarrow H_2g$ + hydrocarbons g,l and s		1.7	2.0	(10)
$C_3H_8g \rightarrow H_2g$ + hydrocarbons g,l and s		1.5	1.8	(10)
$C_4H_{10}g + H_2g$ + hydrocarbons g,l and s		1.4	1.6	(10)
$CH_4g + 2O_2g \rightarrow CO_2g + H_2Ol$		4.4	5.2	(10)
$CH_4g + 2O_2g$ + [1 mol % $(C_2H_5)_2Se$] $\rightarrow CO_2g + H_2Ol$		5.7	6.7	(10)
$2C_2H_6g + 7O_2g \rightarrow CO_2g + H_2Ol$		6.8	8.0	(10)
$(CN)_2g \rightarrow$ 5% to N_2g and Cs; 95% to paracyanogen s		7.8	9.2	(12)
$2NH_3g \rightarrow N_2g$ and $3H_2g$	18°	1.01	1.19	(13)
	25°	1.0	1.2	(10)
	108°	2.0	2.35	(13)
	220°	2.92	3.44	(13)
	315°	3.15	3.80	(13)
$H_2Sg \rightarrow H_2g + Ss$	18°	3.40	4.00	(13)
	95°	2.80	3.30	(13)
	220°	2.38	2.80	(13)
$H_2Ss \rightarrow H_2g + Ss$	−190°	3.?	4.?	(13)
$N_2Og \rightarrow$ $N_2g + O_2g$; $N_2g + NOg$	−78°	2.74	3.23	(13)
	18°	2.21	2.61	(13)
	220°	2.95	3.48	(13)
$H_2g + Cl_2g \rightarrow 2HClg$		4000	4700	(14)
$2HClg \rightarrow H_2g + Cl_2g$		0.76	0.90	(15)
		1.24	1.46	(10)
$H_2g + Br_2g \rightarrow 2HBrg$		0.54	0.64	(16)
$2HBrl \rightarrow H_2g + Br_2g$		2.6	3.1	(16)
KI in acid soln. → free I		0.76	0.90	(16)

Reaction l = liquid, g = gas, s = solid	$\frac{M}{N}$ (a)	$\frac{M}{N}$ (b)	Lit.
$xHCN \rightarrow (HCN)_xs$ + 5% N_2g	10.5	12.4	(12)
$C_2N_2g + O_2g \rightarrow$ 63% $\rightarrow (CNO)_xs$; 37% $\rightarrow CO_2g + N_2g$	7.2	8.5	(10)
$C_2N_2g + H_2g \rightarrow$ 67% $C_2N_2 \rightarrow (HCN)_xs$; 33% $C_2N_2 \rightarrow (C_2N_2)_xs$	6.8	8.0	(10)
$C_2H_4g \rightarrow H_2g$ + hydrocarbons g, l, and s	5.0	5.9	(10)
$C_2H_2g \rightarrow (C_2H_2)_xs$ + 2% H_2g	19.5	23.0	(10)
$C_2H_2g \rightarrow (C_2H_2)_xs$ + 1+% H_2g	20.5	24.2	(19)
$C_2H_2g + H_2g \rightarrow (C_2H_2)_xs$ (11% H_2 reacted)	19.6	23.1	(10)

Catalytic Effect of Inert Gases (10, 20, 21)

The $-M/N$ values in the table below give the total number of molecules of reactants disappearing for each ion pair of both catalyst and reactants. Example: $\frac{M_{C_2H_2}}{N_{(C_2H_2 + N_2)}} = 18.7$, means that 18.7 molecules of C_2H_2 polymerize to $(C_2H_2)_xs$ for each ion pair whether formed in the reactant or in the catalyst. With the increasing ratio of catalyst to reactant, a decrease in the $-M/N$ is indicated—probably attributable to exhaustion effects. Values by the (a) method only are given.

Reactants	Catalysts: Pure gas	N_2	H	Ne	A	Xe	CO_2	H_2
C_2H_2	19.5	18.7 to 17.8	20.1 to 17.0	19.6 to 16.3	18.2 to 15.0	18.5	17.4	19.6
C_2N_2	7.2	7.2				7.2		reacts
HCN	10.8	10.0				10.0		
$2H_2 + O_2$	5.13	5.0					reacts	
$2CO + O_2$	5.7				3.9		none	

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(10) Lind and Bardwell, *O.* (11) Duane and Scheuer, *199*, **10**: 33; 13. (12) Lind, Bardwell and Perry, *O.* (13) Wourtsel, *199*, **269**: 332; 19. (14) Bodenstein and Taylor, *1*, **37**: 24; 15. (15) Cameron and Ramsey, *4*, **93**: 965; 08. (16) Lind, *199*, **8**: 289; 11. (17) Mund, *327*, **44**: 336, 25. (18) Lind and Bardwell, *1*, **47**: 2675; 25. (19) Mund and Koch, *28*, **34**: 241; 25.
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SATURATION CURRENT. ABSORPTION IN LIQUIDS AND SOLIDS

STEFAN MEYER

SATURATION CURRENT AND NUMBER OF IONS FOR α-RADIATORS

The saturation current is $I_s = Zke$ where Z = number of α-particles per sec per unit mass, k = number of ion-pairs per α-particle and $e = 4.774 \times 10^{-10}$ es.

Number of Ions, k

Based on the values of Ra-C′ and the following alternative Z values for 1 g of Ra: (a) $Z_{Ra} = 3.72 \times 10^{10}$ (19, 28); (b) $Z_{Ra} = 3.45 \times 10^{10}$ (12).

$$k = A \times 10^4$$ (9, 11, 13, 18, 45, 47)

Element	A (a)	A (b)	Element	A (a)	A (b)
U_I	1.16	1.25	An	1.95	2.10
U_{II}	1.27	1.37	Ac-A	2.12	2.28
Io.	1.31	1.41	Ac-C	1.88	2.03
Ra	1.36	1.47	Ac-C′	(2.09?)	(2.25?)
Rn	1.55	1.67	Th	1.23	1.32
Ra-A	1.77	1.83	Rd-Th	1.53	1.64
Ra-C	(1.47?)	(1.58?)	Th-X	1.61	1.78
Ra-C′	2.20*	2.37*	Tn	1.78	1.92
Po	1.50	1.62	Th-A	1.92	2.07
Pa	1.44	1.55	Th-C	1.71	1.85
Rd-Ac	1.69	1.82	Th-C′	2.54	2.73
AcX	1.61	1.74			

* Basic values.

The value of $Z_U = Z_{U_I + U_{II}}$ may be obtained from Z_{Ra} and the basic equilibrium ratio $Z_{Ra}/Z_U = 3.4 \times 10^{-7}$.

The value of Z_{Th} may be calculated from the decay constant of Th. For the following assumed values of the half-life, $T_{1/2}$, of Th we find for Z_{Th}: 1.25×10^{10} yrs, 4.5×10^3 α sec⁻¹; 1.65×10^{10}, 3.4 α sec⁻¹; and 2.2×10^{10}, 2.6 α sec⁻¹.

Saturation Current

1. (In Electrostatic Units) (2, 3, 4, 5, 6, 7, 8, 20, 26, 31, 32, 34, 43)

Element			U_I U_{II}	Io	Ra	Rn	Ra-A	99.96% Ra-C'	Po
In equilibrium with	1 g U	I_s =	1.47	0.79	0.82	0.94	1.08	1.38	0.91
	1 g Ra	$I_s \times 10^{-6}$ =	4.32	2.38	2.12	2.75	3.02	3.01	2.68

2. On the basis of a branching ratio of 3% for the Ac family in equilibrium with 1 g Ra (1, 2, 10, 15, 16, 17, 23, 30, 33, 38, 41).

Element =	Pa	Rd-Ac	Ac-X	An	Ac-A	99.7% Ac-C'
$I_s \times 10^{-4}$ =	7.93	9.00	8.86	10.7	11.7	10.4

3. 1 g U in ores [*i.e.* U + 97% (Io→Ra-G) + 3% (Pa→Ac-D)] is equivalent to I_s = 7.30; 1 g (U_3O_8→Ra-G) to I_s = 6.2; and 1 g average ore with 50% U_3O_8 to I_s = 3.1.

4. 1 curie Rn is equivalent to $I_s = 2.75 \times 10^6$ and 1 curie Rn + ½(Ra-A + Ra-C') to $I_s = 6.22 \times 10^6$.

5. In equilibrium with 1 g Th and based on the following alternative Z values for 1 g Th: (*a*), $Z_{Th} = 4.5 \times 10^3$ α sec⁻¹ and (*b*), $Z_{Th} = 3.4 \times 10^3$ α sec⁻¹.

Element		Th	Rd-Th	Th-X	Tn	Th-A	35% Th-C	65% Th-C'
I_s =	(*a*)	0.264	0.329	0.346	0.382	0.413	0.129	0.355
	(*b*)	0.200	0.248	0.261	0.289	0.312	0.097	0.268

RANGE OF α-PARTICLES IN LIQUIDS AND SOLIDS

All values in microns, $\mu = 10^{-4}$ cm

A. IN LIQUIDS

	From Po (35)								From Ra-C' (37, 48)				
Liquid	$C_2H_5OC_2H_5$	C_2H_5OH	CS_2	C_6H_6	$CHCl_3$	$C_6H_5NH_2$	H_2O	$C_3H_5(OH)_3$	C_2H_5OH	C_6H_6	C_5H_5N	H_2O	
$R_{15°}$..	43.0	37.1	36.7	36.3	34.3	33.0	32.0	27.9	7 05	70	63.9	60.0	59.5

B. IN SOLIDS

From Ra-C' (49, 50, 51)

Solid	Li	Mg	Al	Ca	Fe	Ni	Cu	Zn
$R_{15°}$	120.1	57.8	40.6	78.8	18.7	18.4	18.3	22.8

Solid	Ag	Cd	Sn	Pt	Au	Tl	Pb
$R_{15°}$	19.2	24.2	29.4	12.8	14.0	23.3	24.1

C. IN PHOTOGRAPHIC PLATES

Source	Ra-A	Ra-C'			Th-C'	Po	
Type of plate	Ilford	Sigurd (Jahr)	Ilford			Sigurd	
$R_{15°}$.......	34.8	50.0	50.7	54	48.2	27.7	23
Lit..........	(21)	(36)	(21)	(21)	(22)	(36)	(35)

D. PLEOCHROITIC HALOES *v.* (53)

STOPPING POWER EQUIVALENTS OF AIR AND METALS AT DIFFERENT PARTS OF THE PATH OF AN α-RAY

Milligrams per cm² of foil equivalent to 1 cm air lying between the distances given, measured from end of range. 15°C and 1 atm. (29).

Distances cms	0–1	1–2	2–3	3–4	4–5	5–6	6–7
Al	1.90	1.71	1.65	1.64	1.63	1.62	1.62
Ag	3.805	3.28	3.10	3.01	2.93	2.86	2.81
Au	6.10	4.84	4.44	4.25	4.06	3.96	3.91

INITIAL VELOCITIES OF RECOIL ATOMS

$u = A \times 10^7$ cm sec⁻¹

From	To	A =	From	To	A =
U_I	UX_1	2.39	An	Ac-A	3.36
U_{II}	Io	2.54	Ac-A	Ac-B	3.58
Io	Ra	2.62	Ac-C	Ac-C''	3.44
Ra	Rn	2.72	Ac-C'	Ac-D	3.61
Rn	Ra-A	2.96	Th	Ms-Th₁	2.40
Ra-A	Ra-B	3.16	Rd-Th	Th-X	2.86
Ra-C	Ra-C''	2.99	Th-X	Tn	2.99
Ra-C'	Ra-D	3.66	Tn	Th-A	3.20
Po	Ra-G	3.08	Th-A	Th-B	3.39
Pa	Ac	2.74	Th-C	Th-C''	3.26
Rd-Ac	Ac-X	3.02	Th-C'	Th-D	3.97
Ac-X	An	3.01			

RANGES (PENETRATION) OF RECOIL ATOMS

Ra-A to Ra-B, 0.14 mm in air; 0.83 mm in H_2; *ca.* 20μμ in Ag (52).

Rn to Ra-A—Ra-C, *ca.* 10μμ in Cu and Ni (14, 40).

Th-C to Th-C'', at 15° and 1 atm., 0.553 mm in H_2; 0.129 mm in air (24).

Th-C to Th-D, 15° 1 atm., 0.963 mm in H_2; 0.224 mm in air (24).

THE McCOY NUMBER

The McCoy number is the ratio of the total α radiation to the uni-directional radiation per cm² from a U_3O_8 surface of α-saturated thickness. McCoy (27, 28) found 793 with $I_s = 1.74 \times 10^{-3}$ es per cm² U_3O_8 and St. Meyer and Paneth (34) found 790 with $I_s = 1.73 \times 10^{-3}$. These numbers are smaller than the theoretical.

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RADIOACTIVE RADIATIONS IN GASES

R. D. KLEEMAN

I. RANGE AND VELOCITY OF α-RAYS IN GASES AT 1 ATMOSPHERE

At t° and 1 atm., $R_t = R_0 \dfrac{T}{273.1}$

RANGE IN AIR AT 0° AND 1 ATM. (13)

From	U_I	U_{II}	Io	Ra	Rn	Ra-A
R_0, cms	2.531	2.910	3.028	3.212	3.907	4.476

From	Ra-C′	Ra-C′$_1$*	Ra-C′$_2$*	Ra-F, Po	Pa	Rd-Ac
R_0, cms. .	6.608	8.8	10.6	3.721	3.482	4.432

* Two new α-rays from Ra-C′ by the scintillation method (24)

From	Ac-X	An	Ac-A	Ac-C	Th	Rd-Th
R_0, cms	4.141	5.487	6.241	5.224	2.749	3.810

From	Th-X	Tn	Th-A	Th-C	Th-C′
R_0, cms	4.127	4.799	5.387	4.538	8.168

MEASURED RANGES IN OTHER GASES

	From Ra-C′				From Po		
Gas	Air	O_2	H_2	He	Air	O_2	H_2
$R_{15°}$	6.93 to 6.97	6.26	30.93	32.54	3.76 to 3.95	3.43	16.8
Lit.	(12, 15, 17, 27)	(27)	(27)	(27)	(9, 12, 14, 16, 18, 19, 20, 21, 22, 23, 27)	(21, 27)	(21, 27)

	From Po							
Gas	He	N_2	CH_4	CO	CO_2	NO	SO_2	CH_3Br
$R_{15°}$	17.62	3.82	4.18	3.70	2.49	3.41	2.08	1.86
Lit	(27)	(21)	(21)	(21)	(21)	(21)	(21)	(21)

For range of recoil atoms, *see* p 368

Distribution of Ranges.—This follows a probability law. Thus the most probable range for a Ra-F (=Po) α-ray is 3.85 cm at 15° and 1 atm.; 90% lie between 3.75 and 3.95, and 60% between 3.8 and 3.9 (8). For long range particles from Th-C, Ac-C, and Ra-F, *v.* (2). I. Curie (8.5) found for a very narrow beam for Po, the range $R^{760}_{15} = 3.87$ cm, as against the much greater value of H. Geiger, $R^{760}_{15} = 3.925$ cm.

Velocity of α-particles.—The velocity, u, of any α-ray may be computed from the relation $u^3 = aR$ where a is a constant and R the length of the remaining path (11). Taking $u = 1.922 \times 10^9$ cm sec^{-1} (25) as the *initial* velocity of the α-particles from Ra-C′, at 0° and 1 atmosphere in air, this becomes $u = 1.024_6 \times 10^9 R^{1/3}$ where R is the range.

Example: R_0 for Th-C′ in air is 8.168 cm (Table 1, *supra*). Hence $u = 1.024_6 \times 10^9 \times \sqrt[3]{8.168} = 2.06_4$ cm sec^{-1}, the initial velocity.

The following values of $u \times 10^{-9}$ at 0° and 1 atm. have been directly measured: Ra-A, 1.690 (28); Ra-C′, 1.922 (25); Po, 1.593 (7); Th-C, 1.714 (30); Th-C′, 2.060 (30). S. Rosenblum (22.5) determined directly the ratio of the initial velocities of the α-particles from Th-C—Th-C′ = 1.209.

For velocity of recoil atoms see p. 368.

II. NATURE OF PATH

The path of an α-particle may undergo sudden bends (4, 26, 29). The table gives the number of bends (whose angles lie between the limits $\theta_1 - \theta_2$) for path-lengths (between bends) within the limits $l_1 - l_2$, for 281 Ra-F α-rays in air containing 75% A. The unit of l is 1/128 cm. 0° and 1 atm (3).

	$\theta_1 - \theta_2$ =	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°	90°-180°
$l_1 - l_2$	3-7	11	20	22	8	13	7	6	8
	7-15	21	17	16	5		7		5
	15-30	12	8	7	2			5	
	$\theta_1 - \theta_2$ =	10°-20°	20°-30°	30°-180°					
	30-100	20	3	3					

The ionization along the path of a β particle varies inversely as the square of the velocity of the particle (28.5). The table gives the number, N_1, of ions produced by a ray per first cm of path (13.5). $e = 4.774 \times 10^{-10}$ es.

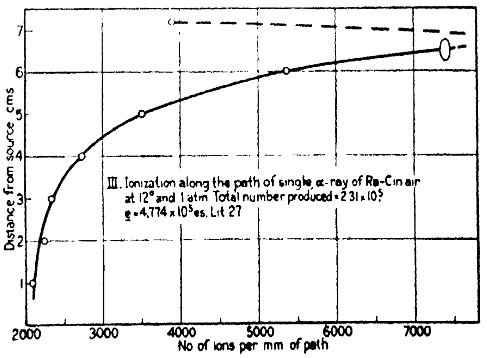
Source	Ac-C″	Th-C″	Ra-B	Ra-C	Ra-E	U
N_1	132	132	130	105	67	76

Coefficients of absorption, λ, of β rays in air and CO_2 at 1 atm. and 22° (18.5).

Substance	Ra-E	Ac-C″	Th-C″	U-X$_2$
Air, λ in cm^{-1}.	0.0152	0.0091	0.0068	0.0065
Air, λ in (g/cm^2)$^{-1}$.	12.70	7.60	5.68	5.43
CO_2, λ in cm^{-1}	0.0297	0.0175	0.0129	0.0114
CO_2, λ in (g/cm^2)$^{-1}$	16.31	9.62	7.08	6.26

Substance	U-X$_1$	Ra-D	Ra-D very soft	Th-B	Ac-B
Air, λ in cm^{-1}	0.12	0.097	0.64	0.090	0.31
Air, λ in (g/cm^2)$^{-1}$.	100	81	535	75	260
CO_2, λ in cm^{-1}	0.23	0.183	1.69	0.142	
CO_2, λ in (g/cm^2)$^{-1}$. . .	126	101	930	78	

Coefficient of absorption λ in cm^{-1} of γ rays from Ra-C′ in air at 1 atm. and 22° is 0.447×10^{-4} (17.5).



III. Ionization along the path of single α-ray of Ra-C in air at 12° and 1 atm Total number produced = 2.31 × 10⁵. e = 4.774 × 10⁵ es. Lit 27

IV. STOPPING POWER OF GASES

$S = \frac{R_{Gas}}{R_{Air}}$ for the same temperature and pressure (⁶).

1. Ionisation method (⁵). 2. Track-condensation method using Ra-F (²¹). 3. Scintillation method. α-rays of $R_{15°}$ 6.15 cm (¹).

Gas	S	Method	Gas	S	Method
A	0 951 Ra-C′	1	CO	985 Ra-C′	1
	.934 Ra-A			976 Ra-A	
A	.930	3	CO	1 02 Ra-F	2
H_2	.24	1	CO_2	1.505 Ra-C′	1
H_2	.22 Ra-F	2		1.488 Ra-A	
He	.201	1	CO_2	1.52 Ra-F	2
He	.1757	3	CH_4	0.860 Ra-C′	1
Kr	1.330	3		.880 Ra-A	
N_2	.989 Ra-C′	1	CH_4	.91 Ra-F	2
	.982 Ra-A		CCl_4	4 00	1
N_2	.99 Ra-F	2	CS_2	2.18	1
Ne	.586	3	$CHCl_3$	3.16	1
O_2	1.064 Ra-C′	1	CH_3Br	2 03	1
	1.057 Ra-A		CH_3Br	2 04 Ra-F	2
O_2	1 08 Ra-F	2	CH_3I	2 58	1
Xe	1 804	3	C_2H_2	1 118 Ra-C′	1
Air	1.00	1		1 121 Ra-A	
H_2O	.77 Ra-F	2		1 122 Rn + Ra	
SO_2	1 82 Ra-F	2	C_2H_4	1 349 Ra-C′	1
N_2O	1.46	1		1 369 Ra-A	
N_2O	1.11 Ra-F	2		1 379 Rn	
C_2H_5Cl	1 405 Ra	1	C_2H_6O	2.00	1
	2 371 Ra-C′		$C_4H_{10}O$	3.437 Ra-C′	1
	2.385 Ra-A			3.471 Ra-A	
C_2H_5I	3 12	1	C_5H_{12}	3.544 Ra-C′	1
C_2H_6	1.514 Ra-C′	1		3.595 Ra-A	
	1 526 Ra-A		C_6H_6	3.33	1

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ABSORPTION AND DIFFUSION OF β-RAYS IN LIQUIDS AND SOLIDS

PIERRE AUGER

Absorption Coefficients.—If I_0 be the initial intensity, and I_x the intensity after screen thickness x is traversed, $I_x = I_0e^{-x\mu}$ where μ, the absorption coefficient, varies slightly with the thickness traversed. d = density.

ABSORPTION BY AL

Source	Ra-D	Th-A	Ra-E	Ac-C	Th-D	Ra-C
μ, cm⁻¹	130	111.0	43 3	28 5	16 3	13 5
Lit	(¹²)					

Source	Ra-D very soft	Ra-B		Rb	Ra	U-X_1	U-X_2
		Soft	Hard				
μ, cm⁻¹	5500	91	13	347	312	500	15
Lit	(¹³)	(⁶)		(¹⁰)	(⁹)	(⁵)	(⁵)

ABSORPTION OF β-RAYS FROM U-X (¹¹)

Screen material	Ag	Al	C	Ca	Cd	Fe	Ir	Mg	Ni	Pb
μ/d, cm² g⁻¹	7.31	4.1	3.75	6.3	7.4	6 61	9.5	4.0	6.35	9.75

Screen material	Rh	S	Sb	Sn	Ta	Zn	NH_4Cl	$CaSO_4$	$SrSO_4$
μ/d, cm² g⁻¹	7.0	4.52	7.74	7.6	8.9	6 4	5 2	4 95	6 50

Screen material	$BaCl_2$	$BaSO_4$	NaCl	KF	KCl	KBr	KI
μ/d, cm² g⁻¹	8.07	7.7	4.68	4.8	4 88	6.1	7.8

ABSORPTION OF β-RAYS OF RA-E (⁷)

Screen	C	Al	Cu	Mo	Ag	Sn
μ/d	15.8	16.9	19.2	21.0	21.7	22.1

If N is the atomic number of the screening element, $\mu/d = 15 + 0.142\,N$.

RANGE IN ALUMINUM OF β-RAYS OF VARIOUS VELOCITIES (LINEAR EXTRAPOLATION)(¹⁵)

RH	1380	1930	2535	3170	3790	4400
Range in cm	0 018	0 064	0.124	0.189	0.279	0 360

RH	5026	6230	7490	8590	11 370
Range in cm	0.440	0 580	0 785	0.925	1.36

Velocity Decrease.—R = Radius of curvature of the β-ray in a magnetic field of N units and field force H gauss. ΔRH is the change in RH due to a screen of 0.01 g cm⁻² and is proportional to the velocity. According to Bohr, $\frac{\Delta RH}{c^2}u^3$ = a constant, K. u = the velocity of the particle, and c that of light (¹⁴).

DECREASE OF VELOCITY FOR β-RAYS FROM RA-B AND RA-C

RH	ΔRH	K	ΔRH	K	ΔRH	K
No screen	Mica screen		Sn screen		Au screen	
1392	138.1	34.8	89.2	22.8		
1660	101.4	34.7	67.4	23.4		
1925	78	33 1	56.8	24.1		
2235	72.6	36 2				
2960	66.7	43 5				
3260	59 2	41				
4840	47.3	39.9	37.6	31.7	32.2	27.3
5255	49 3	42.2	37.8	32.5		
5880	43.1	38	32.2	28.6	32.6	29
6160	41	36.7				
7060	38.4	35.4	30.2	27.8		

Dispersion of β-rays (², ³, ⁸).

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WAVE LENGTHS OF γ-RAYS

E. VON SCHWEIDLER

GENERAL RELATIONS

A wave length of λ milli-Ångstroms (10^{-3} Å = 10^{-11} cm = 1 X-unit), corresponds to:

A Frequency (ν) = $2.9986 \times 10^{21}/\lambda$ sec^{-1}

An Energy ($E = h\nu$) = 1.9653 $10^{-8}/\lambda$ ergs

A Potential $\left(P = \frac{h\nu}{e}\right)$ = 1.2344 $10^{7}/\lambda$ volts

The equivalent electron velocity as a fraction of the velocity of light,

$$(\beta) = \sqrt{1 - \frac{1}{\left(1 + \frac{24.288}{\lambda}\right)^2}}$$

$$h\nu = \frac{hc}{\lambda} = E = Pc = c^2 m_0 \left[\frac{1}{\sqrt{1-\beta^2}} - 1\right].$$

See p. 17 for values of basic constants.

WAVE LENGTHS DETERMINED WITH CRYSTAL GRATINGS

φ = angle of reflexion, d = grating space = 2.814 Å for rock salt = 3.028 Å for calcite. $\lambda = 2d \sin \varphi$. Intensity indicated thus, s = small, m = moderate, g = great, vg = very great.

(*a*) Soft Radiations from Ra-B. Using rock salt (2, 3). Corresponding to L-series of elements of atomic Nos. 82 and 83, according to Swinne (5) and Wagner (6).

λ, in 10^{-3} Å	1365 m	1349 m	1315 s	1286 s	1266 s	1219 s	1196 m
φ, deg. min.	14° 00′	13° 52′	13° 31′	13° 14′	13° 00′	12° 31′	12° 16′
λ, in 10^{-3} Å	1175 g	1141 m	1100 s	1074 s	1055 s	1029 m	1006 m
φ, deg. min.	12° 03′	11° 42′	11° 17′	11° 00′	10° 48′	10° 32′	10° 18′
λ, in 10^{-3} Å	982 g	953 m	917 s	853 m	838 m	809 m	793 m
φ, deg. min.	10° 03′	9° 45′	9° 23′	8° 43′	8° 34′	8° 16′	8° 06′

(*b*) Hard Radiations from Ra-B + Ra-C, Sec. 1. Radiations from Ms-Th and its products, Sec. 2.

λ, in 10^{-3} Å	1. Using rock salt (4)	428	(393)	(324)	296	262	242	229	196
φ, deg. min		4° 22′	4° 00′	3° 18′	3° 00′	2° 40′	2° 28′	2° 20′	2° 00′
Remarks			Probably 2nd order spectrum to 196 and 159		K-series				

λ, in 10^{-3} Å	169 g	159 g	137	116	99 g	71	72	66
φ, in deg. min	1° 43′	1° 37′	1° 24′	1° 11′	1° 06′	43′	41′	37.5′
Remarks	K-line						Using calcite (18)	
	Ra-C?	Ra-B?						

λ, in 10^{-3} Å	58	48	37	28	2. Ms-Th (29)	168 g	145 g	62 s	52 m
φ, deg. min	33′	27.5′	21′	16′					
Remarks	Using calcite (18)						to Rd-Th		to Th-B

WAVE LENGTHS CALCULATED FROM THE ENERGY OF β-RAYS

Primary γ-rays of energy E_γ produce in the disintegrating atom itself, or in other atoms, secondary β-rays of energy $E_\beta = E_\gamma - A$, where A is the work of removal and depends upon the level from which the β-rays originate. Sometimes it is assumed that the β-rays are primary and produce secondary γ-rays of energy $E_\gamma = E_\beta$. The energy of the β-rays is obtained from their magnetic deflections.

λ, in 10^{-3} Å	Ra	66	Ra-B	230	174	155	51.9	51.3 m
Lit		(14, 22)		(26)	(26)	(26)	(22)	(26, 29)

λ, in 10^{-3} Å	48.0 s	42.6	42.0 m	35.6	35.2 g	Ra-C + Ra-C′	209?	52.1?
Lit	(29)	(22)	(26)	(22)	(26)		(26)	(26)

λ, in 10^{-3} Å	49.8?	44.4?	28.9?	45.4	37.5	32.0	30.2	29.0
Lit	(26)	(26)	(26)	(16)	(16)	(16)	(22)	(29)

λ, in 10^{-3} Å	24.9	24.3	21.2	20.6	20.4	20.3	16.2?	10.93 g
Lit	(16)	(29)	(29)	(22)	(29)	(26)	(29)	(29)

λ, in 10^{-3} Å	10.0 s	9.93 g	7.00 s	6.94 g	5.56? g	Ra-D	269
Lit	(29)	(29)	(29)	(29)	(29)		(13)

λ, in 10^{-3} Å	Ms-Th	171	59.7	53.0	37.1	37.0	29.7	26.9 g
Lit		(22)	(22)	(22)	(29)	(22)	(22)	(29)

λ, in 10^{-3} Å	Rd-Th	147	Th-B	52.0 g	52	41.6	41.3 s	Th-C′	45.2 s
Lit		(13)		(29)	(13)	(16)	(29)		(29)

λ, in 10^{-3} Å	24.5	21.3	13.6 g	13.5 g	12.8 m	Th-B + Th-C	4.84	4.71
Lit	(16)	(29)	(29)	(29)	(29)		(34)	(34)

EFFECTIVE WAVE LENGTHS CALCULATED FROM ABSORPTION AND SCATTERING

The ordinary or "apparent" absorption coefficient, $\mu' = \mu + \sigma$, where μ is the "true" or "fluorescent" absorption coefficient, and σ the coefficient of scattering. For dependence on wave length v. Glocker (8); Compton (12); Wingårdh (23); Warburton and Richtmyer (24); Jauncy (28); and Allen (30).

γ-RAYS FROM RA-C

λ_{eff}, in 10^{-3} Å	<63	<60	120–60	80–30
Calc. from	Abs.	Abs.	Scat.	Abs.
Lit	(7)	(9)	(12a)	(10b)

λ_{eff}, in 10^{-3} Å	30-25	21	24	8	19	19.5
Calc. from	Scat.	Abs.	Abs.		Scat.	Scat.
Lit	(12b)	(31)	(33)		(32a, 32b)	

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RADIOACTIVE RADIATIONS FROM ORDINARY METALS

R. B. MOORE

1. POTASSIUM AND RUBIDIUM

β-rays only are emitted spontaneously, the emission being an atomic property independent of the temperature

ACTIVITY OF K IN ARBITRARY UNITS (4)

Salt	K_2SO_4	KI	KBr	KCl	KF	$KClO_3$	KNO_3
%K...	44.91	23.58	32.87	52.18	67.32	28.91	28.69
Activity..	37.8	21	27.8	42.2	54.0	25.5	30.6
K/Act.	118	112	118	124	123	110	126

ABSORPTION OF THE β-RADIATION (6)

λ = absorption coefficient cm^{-1}, *d* = density of absorbent

λ/*d* for β-rays from K		λ/*d* for β-rays from Rb	
By K_2SO_4	11.32	By Rb_2SO_4	96.7
By Sn (90% of the rays)	14	By paper (90% of the rays)	162
By Sn (10% of the rays).	90	By paper (10% of the rays).. .	950

ABSORPTION OF β-RAYS FROM RB BY PAPER (5)

W = wt. paper/cm^2. I_0, intensity of the initial radiation; I_p, that of the emergent radiation.

W	0	0.00153	0.00305	0.00458	0.00764	0.0107	0.0153	0.0198
I_p/I_0..	1	0.725	0.515	0.422	0.260	0.159	0.087	0.034

2. CAESIUM, SODIUM, LEAD, IRON AND ZINC

Cs and Na are not radioactive (8, 9, 10). Ordinary Pb shows a slight, very old Pb only a trace of activity On account of their exceptionally small activity Fe and Zn are recommended for construction of sensitive instruments for radioactive measurements. Ca, Ba, Sr, C, Cl, Br, Cu, Fe, Pb, Mg, Mn, Ni, Ag, Zn. W, Ta, La, Se, As, Sn. Au, Sb, Al and Hg are inactive (10).

3. NOTES

O Hahn and M. Rothenbach (3) compared Rb salts of various ages but no difference in activity was detected. The Rb rays were found to be more penetrating than the β-rays of UX_1, but not so penetrating as those of Ra. The ratio of the intensity of the Rb rays to those of UX_1 is 1:15. The half-life of rubidium is calculated to be 10^{11} years and that of potassium 3 to 7 times greater. The absorption coefficient in Al of K is from 39.6 to 55.4 as foil thickness increases from 0.0135 to 0.0405 cm. Rb decreases from 593 to 522 as foil increases from 0.0017 to 0.0051 cm.

According to Bergwitz (1) the velocity of the Rb rays is 1.85×10^{-10} cm-sec^{-1}

Ringer (7) states that pure K and Rb give off homogeneous β-rays, the K rays having 10 times the penetrating power of the Rb rays. Harkins and Guy (10) give this figure as from 10 to 15 and state that the radiation from Rb is slightly heterogeneous.

Geiger (2) found that the saturation current from RbCl is the same at room temperature and at liquid-air temperatures.

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DISTRIBUTION OF RADIOACTIVE MATERIALS IN THE ATMOSPHERE, THE HYDROSPHERE AND THE LITHOSPHERE

HERMAN SCHLUNDT

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RADON IN THE ATMOSPHERE

Method A: Rn absorbed in charcoal.

Method B: Rn condensed with liquid air.

Method C: Rn directly determined in large ionization chamber.

Method D: Rn computed from active deposit on negatively charged wire.

Place	Micro-micro Curies (10^{-12} Curies) Rn per cubic meter	Method	Number of determinations	Lit.
Montreal, Can	24–127, Mean, 80	A		(21)
Montreal, Can . .	Mean, 60	A	50 during 1907–8	(22)
Cambridge, Eng......	35–350, Mean, 105	A	60 during 6 mos	(23)

Place	Micro-micro Curies (10^{-12} Curies) Rn per cubic meter	Meth-od	Number of determinations	Lit.
Chicago, U. S. A.	45–200, Mean, 100	B	6	(1)
Manila, P. I.	71	A	30 during 1 year	(136)
Freiburg, Switzerland	54–305, Mean, 131	A or B		(78)
Innsbrück, Austria	40–1110, Mean, 433	C	49	(137)
Seeham, Austria	188	C		(116)
Tokyo, Japan	5	D		(49)
Pacific Ocean	1 3	D	Mean of 169, 1915–21	(66)
Atlantic Ocean	1 7	.	Mean of 79	(66)
Indian Ocean	1 3	..	Mean of 37	(66)
Southern Ocean S. of lat. 50°	0.3	...	Mean of 48	(66)
All accessible ocean areas	1 2	..	Mean of 333	(66)
High seas	2 6	...	Mean of *ca.* 400*	(66)

* Includes some made relatively near large bodies of land

RADIOACTIVITY OF SPRING AND WELL WATERS AND SPRING GASES

$m\mu Cl^{-1}$ = Millimicrocuries (10^{-9} Curies) per liter

Ra, $\mu\mu gl^{-1}$ = Dissolved radium, micro-micro-grams (10^{-12} g) per liter

NORTH AMERICA

Source	t°C	$m\mu Cl^{-1}$		Ra, $\mu\mu gl^{-1}$	Lit.
		Water	Gas		
CANADA					
Quebec					
Maskinonge	8	0 079	0 250	0 5	(99)
Radnor Forges	10	0 345		0 3	(99)
St. Benoit	11	0.028		0 0	(99)
St. Leon (Lupien)	8	0.148	0 46	0 8	(99)
St. Hyacinthe (Philudor)	8	0 106		46	(99)
St. Severe	8	0 087		2 8	(99)
Varennes	9	0 224	0 81	9 2	(99)
Ontario					
Borthwick, near Ottawa	11	0 140		8 4	(99)
Sulfur Spring, Caledonia Spr.	8	0 073		5 6	(99)
				15 0	(23)
Duncan Spring, Caledonia Spr.	9	0 053	0 204	5 6	(99)
Duncan Spring, Caledonia Spr.	9		0 42	18 0	(23)
Gas Spring, Caledonia Spr	8	0 090	0 306	8 4	(99)
Gas Spring, Caledonia Spr	8		0 62	15	(23)
White Sulfur Spring, Carsbad	9	0.09		0 8	(99)
Magic Spring	9	0.087		25	(99)
Soda Spring	9	0 081	0 23	1 1	(99)
Russell Lithia, Bourget	10	0.056		5 9	(99)
Alberta (Banff)					
Upper Hot Spring	46	0 221		8 6	(99)
Kidney Spring	39	0.392		8 5	(99)
Cave Spring	30	0 470	3 34	8.5	(99)
Basin Spring	35	0.232	2.37	8.5	(99)
Auto Road Spring	19	0.640	,	23.5	(99)

Source	t°C	$m\mu Cl^{-1}$		Ra, $\mu\mu gl^{-1}$	Lit.
		Water	Gas		
British Columbia					
Fairmont Springs		3 5		100	(11)
Sinclair		4.0		tr.	(11)
UNITED STATES					
Arlington, R. I.					
Graphite Mine Spr		8.78			(79)
Williamstown, Mass.					
Wampanoag	22	0.22	7.3		(118)
Sherman Spring		0.04			(118)
Saratoga Spr, N. Y.					
Emperor	10	0 07	0 221	68	(71)
Hathorn No. 1	10	0 142	0 213	42	(71)
Geyser	10	0 039	0 034		(71)
Pump Well No. 4	12	0.231	0 678	21	(71)
Crystal Rock	10	0.88	0.847	9	(71)
Indiana					
Mean of 27 sprs	cold	0.75			(89)
French Lick					
Pluto Spring	13	0 54			(8)
Bowles Spring	10	1 78			(8)
Illinois					
Dixon Spr No. 2		2 93			(118)
Creal Spr. No. 3		0 84			(115)
Well, Joliet		0 39			(115)
Mt. Vernon Spring		0 18			(118)
Yellowstone Nat Pk					
Mammoth Hot Spr., Hot River	51	1 44		2 5*	(104)
Main Spring	71	none	none	3 8*	(104)
Apollinaris Spr	9	1 08			(104)
Nymph Spring, Tower Falls		0 23	6.5		(104)
Upper Geyser Basin, Bench Spring	86	0 22	124		(104)
Fish Cone, West Thumb			41.8		(104)
Lower Geyser Basin, Firehole Lake	85	0 28	204		(104)
Missouri					
Sweet Springs		0 81			(103)
Rollins Spring, Columbia		0 15			(103)
Hot Springs, Ark.					
Imperial Spring	61	9.03			(9)
Palace Spring	61	0 12			(9)
Avenue Spring	62	0.89			(9)
Twin Spring	62	2 22			(9)
Arsenic Spring	54	0 49			(9)
Horseshoe Spring	60	0.18			(9)
Liver Spring	8	0 59			(9)
Kidney Spring	13	3.63			(9)
Madison, Wisconsin					
Merrill Springs		0.49			(101)
Manitou, Colo.					
Shoshone Spring	15	3 38	12.7		(102)
Manitou Soda	15	1 25			(102)
Manitou Soda	15	0 268	1.62		(54)
Shoshone		1 66	15 52		(54)
Iron Soda Spring	15	0.24	1.15		(54)
Iron Soda Spring	15	1 53	1.07		(102)
Navajo Spring		1.37	3 4		(102)
Navajo Spring	22	1.21	3.3		(54)
Steamboat Springs, Colo.					
Soda	15	0.18	1.42		(102)
Soda	15	1.36	6 03		(54)

* Ra in 10^{-12} g per g of residue.

Source	t°C	mμCl⁻¹ Water	mμCl⁻¹ Gas	Ra, μμgl⁻¹	Lit.
UNITED STATES.—(*Cont'd*)					
Steamboat Springs, Colo.—(*Cont'd*)					
Bath House	40	0 08	0.54		(102)
Bath House	40		0.79		(54)
Iron	24	0 99	3.71		(102)
Iron	24	0.91	3.50		(54)
Craddock, Glenwood Springs, Colo		2 21			(54)
Virginia					
Mean of 11 springs		0 21			(120)
Ohio					
Mean of 9 springs	cold	0.34			(89)
Bloomington, Ind.					
Hottle Spring*		0.806			(90)

* Mean of 37 tests during 9 months.

EUROPE

Source	t°C	mμCl⁻¹ Gas	mμCl⁻¹ Water	Lit.
AUSTRIA				
Tauern Tunnel		3 81*		(62)
Böckstein Valley		3.20†		(62)
Near Vienna				
Johannesbad	30	1 86	6 8	(63)
Haupt Quelle, Vöslau	23	0 29	1 07	(63)
Tyrol				
Magenquelle, Froy	6	17 6		(2)
Eisenquelle, Froy	8	4 5		(2)
Badequelle, Steinhof	9	0 8		(2)
Herrenbadquelle, Fischau	19	0 23	0 80	(63)
Gastein				
Grabenbäckerquelle	36	55 5		(60, 61)
Elisabethstollen, Hauptquelle	47	53 3		(61)
Nordquelle	44	9 0		(61)
Rudolfsstollen	47	21.3		(61)
Franz Josephstollen	41	34 6		(60, 61)
Reissacherstollen	36	84		(61)
Teichquelle, Tanbach		21 3		(61)
Melaniequelle, Radegund		5 3		(132)
Annenquelle, Mariatrost		0 36		(132)
Johannesbrunnen, Semmering	5	1 27		(3)

* Mean of 101 springs; highest 23.7.
† Mean of 3 springs.

Source	mμCl⁻¹ Gas	mμCl⁻¹ Water	Lit.
BELGIUM			
Delcor Spa	1.45		(34)
Marie-Henriette Spa	1.45		(34)
Prince de Conde I. Spa	1.44	1 74	(34)
Tounelet, Spa	1 67	2 58	(34)
La Fraineuse Spa	2.43		(34)
Claire-Fagne Spa	2 1		(34)
Salmon E. superieure Spa	3.31		(34)

Source	t°C	mμCl⁻¹ Water	mμCl⁻¹ Gas
CZECHO-SLOVAKIA (20, 51, 63, 139)			
Loimannsquelle, Franzenbad	11	0.39	0 27
Salzquelle, Franzenbad	11	0.05	
Mine water, St. Joachimsthal 60 m depth	6	13.5	
375 m depth	14	75.9	
500 m depth		163.8	448.0
Bernhardsbrunnen, Karlsbad	61	0.65	1.14
Mühlbrunnen, Karlsbad	39	12.9	38.6
Schlossbrunnen, Karlsbad	30	7.1	20.6
		3.61	
Hospitalquelle, Karlsbad	12	0.96	
Sprudel,* Karlsbad	71	0.16	0.36
Eisenquelle, Karlsbad	8	15.7	
		19.5	
Ferdinandsbrunnen, Marienbad	10	0.27	
Kreuzbrunnen, Marienbad	8	1.75	3.56
Marienquelle, Marienbad		0.71	
Waldquelle, Marienbad	7	1.87	4.47
Augenquelle, Teplitz Schönau	22	1.28	
Riesenquelle, Dux		3.58	
Urquelle, Dux	46	2.03	9.0

* 55 × 10⁻¹² Ra per liter

Source	mμCl⁻¹ Water	mμCl⁻¹ Gas	Lit.
ENGLAND			
Nine Wells, Cambridge	0.130		(94)
Well, Dale's Brewery, Cambridge	0.196		(94)
King's Well, Bath	1.73	33.65	(88)
Cross Spring, Bath	1.19		(88)
Hetling Spring, Bath	1.70		(88)
Hospital Natural Baths, Buxton	0.83	7.70	(64)
Gentlemen's Natural Baths, Buxton	1.10		(64)

Source	t°C	mμCl⁻¹ Gas	mμCl⁻¹ Water	Lit.
FRANCE				
Choussy, La Bourboule		22.9	141.5	(52)
Choussy, La Bourboule		20.5	161.4	(53)
de la Grange, Beaucens		3.03	10 36	(52)
Chaude, Audinac		0.14	0.59	(52)
Rivière, Chaudeau		6.51	39.5	(12)
Dames, Plombières		10.76		(12)
Lambinet, Plombières		15.96		(12)
Savonneuse, No. 2, Plombières		7.47	35.1	(12)
Vauquelin, Plombières		4.83	86.4	(12)
Chaudes-Fontaines, Reherry		4.1	19.8	(12)
Celestins, Vichy	44	0.653	4.1	(52)
Chomel, Vichy	44	0.653	4.1	(52)
Boussange, Vichy	42	0.103	0.60	(52)
Hôpital, Vichy	34	0.022	0.14	(52)
Condanny, Usson		0.563	34.5	(65)
Plaies, Usson		0.663	1.9	(65)
d'Alun, Aix-les-Bains		4.1	25.8	(16)
Le Lymbe, Bourbon-Lancy		1.5	14.6	(16)
Pavillon, Coutreville		0.51		(16)
Bordeu (Grande Source), Luchon	43	16.1	134.8	(73)
Main Spring (Saline and H_2S), Uriage-les-Bains		0.113		(8)
Gasseng, Columbières-sur Orb			6.69	(18)
Cabanel, Columbières-sur Orb			2.22	(18)
Crémieu, Columbières-sur Orb			1.49	(12)
Viguerie, Ax			16.8	(72)
Savonneuse, Bains-les-Bains			25.6	(72)
Vielle, Eaux-Bonnes			3.7	(72)
La Chaldette			93.7	(72)
Romaine, Maizières			10.8	(72)
Souveraine, Vals-les-Bains		1.047	5.08	(6)
Dominique, Vals-les-Bains		8.80		(6)

Source	t°C	mμCl^{-1}		Lit.
		Gas	Water	
Caroline, Mont-Doré		0.34	2 49	(57)
Lepape, Bagnères-de-Luchon		41.5		(53)
Providence, Vernet-les-Bains	38	15.7	115.9	(53)
Santé, Vernet-les-Bains	37	2.7		(53)
Pastural, Les Escalades	27	3 5		(53)
Bassin Carré, Thuès-les-Bains	74	1.04	17.7	(53)
Saint-Victor, Royat	21	15.35	35 2	(53)
Hamel, Sail-les-Bains	34	11 5	50 2	(53)
Rouge, Saint-Nectair	21	0.54	2.2	(53)
Grande Source, Bagnoles-de-l'Orne		0 74		(56)
Chaude fontaine, Antoigny		3.86		(56)
Saint-Ursin, Lignières		1 57		(56)
Fontaine Minerale, St. Michel		0 44		(56)

Source	t°C	mμCl^{-1} Water	Lit.
GERMANY			
Schwarzwald Region			
Antoniusquelle, Antogast	cold	6.6	(20)
Büttquelle, Baden-Baden	24	51.3	(20)
Murquelle, Baden-Baden	59	9 8	(20)
Kirchenquelle, Baden-Baden	56	1 35	(20)
Hauptquelle, Badweiler	28	3 1	(20)
Gemeindequelle, Badweiler	23	4 2	(20)
Badquelle, Griesbach	cold	10 6	(20)
Sofienquelle, Petersthal	cold	1 76	(33)
Wenzelquelle, Rippoldsau	cold	0 86	(33)
Warme Quelle, Wildbad	36	1 35	(20)
Kalte Quelle, Wildbad	cold	0 08	(20)
Well, Heidelberg	27	2.15*	(7)
Wurttemberg			
Göppinger, Sauerbrunnen		1 27	(50)
Göppinger, Staufenbrunnen		0.57	(50)
Kursaal, Kanstatt		0 22	(50)
Karlsquelle, Mergentheim		0 98	(50)
Hirchquelle, Feinach		0 42	(50)
Wildbad		0.76	(50)
Hessen and Adjoining Regions			
Sprudel XII, Bad Nauheim	33	5 8†	(105)
Karlsbrunnen, Bad Nauheim	15	9 6†	(105)
Bad Homburg, Elizabethbrunnen	11	1 46†	(105)
Luisenbrunnen	11	0 84†	(105)
Wilhelmsbrunnen, Bad Soden	14	6 62†	(105)
Solbrunnen, Bad Soden	16	1 56†	(105)
Inselquelle, Kreuznach	13	7 42†	(105)
Theodorshalle, Kreuznach	7	3 06†	(105)
Hauptbrunnen, Münster am Stein	31	8 5†	(105)
Kochbrunnen, Wiesbaden	68	0 43‡	(39)
Adlerquelle, Wiesbaden	64	2 23‡	(39)
Schützenhofquelle, Wiesbaden	50	0 29‡	(39)
Racoczy, Kissingen		1.04†	(41)
Maxquelle, Kissingen		1 58†	(41)
Maxquelle, Dürkheim a.d. Haardt	20	0.69	(7)

* 1620 × 10^{-12} g Ra per liter of water.

† Values obtained by multiplying Mache units by 3 64 × 10^{-10}

‡ Values obtained by multiplying Mache units by 4.1 × 10^{-10}

Source	mμCl^{-1} Water	No. of samples	Lit.
Bavaria			
Alexanderbad	7.73	2 spr., 6 wells, 1 reservoir	(38)
Ebermanstadt and env	0.43	18 spr., 2 w.	(38)
Epprechstein and env	1.17	2 spr., 7 w., 2 reservoirs	(38)
Fichtelgebirge, Neubau	1.55	5 spr., 8 w.	(38)
Leinleiterthal	0.36	21 spr., 5 w.	(38)
Leupoldsdorf and env	25.0	6 spr., 2 w., 5 reservoirs	(38)
Schwarzenfeld and env	0.64	3 spr., 6 w.	(38)
Weisenthau	1.32	15 spr., 6 w.	(38)
Wolsenberg and env	4.87	17 springs	(38)
Wundsiedel and env	7 7	13 spr., 6 w., 1 reservoir	(38)
Saxony			
Wettingquelle, Brambach	826 2		(31)
	650 to 754		(89)
Trinkquelle, Oberschlema	688 to 920		(89)
Marx Semler Stollen, Oberschlema	288 to 330 at 10°C		(97)
Himmelfahrtstollen, Georgenthal	24 1		(97)
Olga Brunnen, Schneeberg	13.1		(97)
Rockelmann Quelle, Schwarzenberg	12 3		(97)

Source	t°C	mμCl^{-1}		Lit.
		Water	Gas	
HUNGARY				
Budapest				
Rakocsy, St. Lucasbad	42	7.40		(134)
Composite, 17 spr. Lucasbad		3.35	9.08	(128)
Trinkquelle, Kaiserbad	60	0.31		(134)
Grosse Quelle, Ritzenbad	43	3 16		(134)
Kerekmalom Quelle	20	0.11		(32)
Arpadquelle	23	0 046	0.624	(32)

Source	t°C	mμCl^{-1} Water	Lit.
ITALY			
Sorgente Montirone, Abano near Padua	87	2.05*	(20)
Upper Sulfur Therm, Aqui Piemont	72	0.28*	(20)
Fiuggi, Anticoli		8.02*	(20)
Surgonne Grotta, Battaglia near Padua	74	3.34*	(20)
Acidola, Castellamare	13	9.27*	(20)
Domenico Tricarico, Bagnoli near Naples	52	0.79*	(20)
Purgativo, Agnano near Naples	90	0.79*	(20)
Stabilimento, Porto d'Ischia	65	1.93*	(20)
Manzi I, Cassamicciola, Ischia	85	0.57	(20)
Old Roman Spring, Lacco Ameno, Ischia	57	152 5*	(20)
Fonte di Castello, Santa fiora	12	3.01	(77)
Fonte della Casella, Casteldelpiano	12	1.85	(77)
Acqua dei Bagnoli, Acidoso	14	3.29	(77)
Polla di Sotto, Bagnore	20	1.52	(77)
Sambuco, Montagna	8	2.08	(77)
Baleno Carcaiole, Uliveto		1.09 Gas = 8.6	(78)
Pozzo delle Saline, Salsomaggiore		4.41	(76)
Bagni di Casciana		0.0 Gas = 1.8	(77)
Parlanti, Monsummano	31	0.064	(92)

* Values obtained by multiplying Mache units by 4.1 × 10^{-10}.

Source	t°C	mμCl⁻¹ Water
NORWAY (86)		
Nasodden		17.9
Sandsvar		12.9
Jellum, near Modum		31.2
Tandberg estate, Simoa Valley		67.4
PORTUGAL (81)		
Sabroso, Sabroso (Vidago)		3.29
Fonte Romana, Fonte Romana		2.05
Da Bica, Ferez		8.20
Das Lamas, Cucos		10.4
RUMANIA (58)		
Orsova		
Hercules, Baile Herculane	46	0.19*
Regina Maria, Baile Herculane	60	0.22
RUSSIA (68)		
Essentuky No. 6, Caucasus		3.5
Batalinsky, Caucasus		0.6
SPAIN (15)		
Rivas, Gerona		0.33
Buitre, Seirra de Fuensante, Murcia		0.05
Garganton y Pianolon, Sierra de Guadarrama		12.5
La Raja, Mazarron, Murcia		0.46
El Tubo, Mazarron, Murcia		0.48
Posa de Levante, Mazarron, Murcia		0.36
Medica Catalan, Mazarron, Murcia		0.68
SWEDEN (91, 119)		
Slottskallan, Upsala	7	1.8
Bourbrum, Upsala	6	1.55
Birjerjarlsg No. 120, Stockholm	6	14.6
Gamla (spring), Porla	7	1.77
Sofia (spring), Helsingborg	10	3.00
Villastaden (drilled well), Lidingon	8	17.06
Norrb, L. (well), Bodens fastning	5	70.6
Stockh l. (well), Vinterviken	10	67.2
Hermelinsgruf (well), Malmberget	3	2.75
Kalmar, l. (spring), Sodra Vi	6	14.1
Sanatorie parken (spring), Mosseberg	7	0.90

* Emanation content changes with season and even on same day.

Rock formation of source	No. samples	mμCl⁻¹ Water
SWEDEN.—(*Continued*)		
Boulders, morainal deposits	110	2.40
Diabase	10	0.70
Granite (Archean)	53	13.24
Granite (gneissic)	20	5.66
Granulite	14	10.2
Gray gneiss with granite intrusives	6	6.11
Gneiss (granitic)	20	2.99
Iron-bearing gneiss	12	9.31
Limestone	42	0.78
Peat	16	1.18
Quartz porphyry	5	2.09
Sandstone	37	2.91
Slate	42	1.11
Syenite and granulitic syenite	15	15.46

Source	t°C	mμCl⁻¹ Water	Lit.
SWITZERLAND			
St. Placidus Spring, Disentis		4.66	(127)
Val Lunpegnia, Disentis	8	3.75	(117)
Leuk	51	0.12	(127)
Waadt, Lavey		4.51	(117)
Paracelsusquelle, Engadine, St. Moritz	5	0.57	(117)
Stollenquelle, Pfafers-Ragaz	30	0.29	(117)
Sotsassquelle, Schuls		0.42	(117)
Carolaquelle, Tarast	7	0.46	(117)
Kurhaus, Acquarossa	25	1.24	(117)
Thomas, Val Sinestra	8	0.26	(117)
Les Trois Pigeons, Valangin		0.24	(80)
Come Girard, Locle		0.26	(80)
Vioulou, Paturage, Locle		0.37	(80)
Eplatures		0.15	(80)

ASIA

Source	t°C	mμCl⁻¹, Water
INDIA (122)		
Kaira District, Bombay		
Hot Spring	67	33.0 to 62.1
Cold Spring	28	33.9

Source	t°C	mμCl⁻¹	
		Water	Gas
JAPAN (42)			
Kami-no-yu, Tamatsukuri	64	1.08	10.18
Kami-no-yu, Misasa	71	51.69	
Kabu-yu, Misasa	45	3.72	22.82
Kaminoyu, Dogo	47	1.45	8.5
Tama-no-i, Dogo	cold	0.39	
Hirano, Tansan-sen	26	0.07	0.21
Gosho-no-yu, Kinosaki	60	3.06	
Ko-no-yu, Kinosaki	57	0.94	
Furosen, Beppu	58	0.07	
Kamigawara No. 1, Masutomi	22	301.2	
Kuridaira No. 1, Masutomi	16	214.7	550.6
Yunosawa-Onsen, Innai-Yunosawa	41	0.43	
Takinoyu, Noboribetsu	72	0.074	
Yojo-Kwan-no-yu No. 1, Togo	50	1.12	
Jizo-no-yu, Kusatsu	57	0.057	0.065
Akakura-Onsen, Akakura	62	0.43	
Ji-no-yu, Isobe	9	1.55	0.74
Arima-Onsen, Arima	52	0.92	
Maruyama-Kosen, Arima	19	3.01	
Zui-hoji-Onsen, Arima	31	13.8	
Arifuku-Onsen, Arifuku	43	0.80	
Kizu-no-yu, Asama	44	0.51	
O-yu, O-yu	57	1.13	trace
Kami-no-yu, Oyu	58	0.4	
Shimo-jyaya-no-yu, Sekigane	44	10.95	
Soto-no-yu, Katsura	29	0.31	
Yuatsumi-no-yu, Atsumi		0.40	
Awazu-Onsen, Awazu	54	0.35	
Kami-no-moto-yu, Bobata	14	4.35	
Goshiki-Onsen No. 2, Goshiki	39	0.80	
Tsubataya-uchi-yu, Shibu	48	0.11	
Hie-no-yu, Kaminoyana	62	0.86	5.5
Shiotsu-no-Tsubo, Katayamazu	79	0.47	8.79
Gosho-no-yu A, Kinosaki	63	2.67	
Koyabara-Onsen, Koyabara	38	1.37	2.95
Murasugi-Kosen No. 1	26	18.04	
Osakaya-no-yu, Musashi	45	1.17	11.8
Shirataki-no-yu, Nakabusa	60	0.59	
Tsuru-no-yu, Mikko-Yumoto	62	0.85	
Shin-yu, Unzen	38	0.85	

Source	t°C	mμCl⁻¹	
		Water	Gas
Ogawa-Onsen No. 2	49	1.01	
Omaki-Onsen, Omaka	49	0.48	
Taki-no-yu, Onogawa	70	2.37	
Umeka-no-yu, Owani	62	4.21	
Shigaku-Onsen, Shigaku	47	0.43	0.64
Ena-Kosen, Takayama	10	102.2	
Takarazuka-Tansan-sui, Takarazuka	19	1.20	0.72
Tochiomata-no-yu, Tochiomata	39	9.40	
Wakazaki-no-yu No. 1, Wakura	93	2.52	33.9
Yamanaka-Onsen, Yamanaka	45	0.62	
Yamashiro-Onsen	69	0.25	
Tottori-Onsen, Yoshikata	48	1.19	
Kasuga-Onsen, Teramadu	29	0.22	0.88
Kabu-yu, Yudani	32	1.54	8.65
Sento, Yukiku	67	0.23	3.34
Kabu-yu, Yummra	91	0.31	
Sagi-no-yu, Yunogo	38	0.31	1.95
Taki-no-yu, Yunokawa	50	0.74	8.23
Shinyu, Yunotsu	4	1.8	0.19

Source	t°C	mμCl⁻¹ Water	Lit.
PHILIPPINE ISLANDS			
Sibul Springs, Bulacan		1.28	(135)
Pansol Springs, Laguna		none	(135)
Bambangan Spr., Laguna		0.15	(135)
Adukpung Spr., Kiangan		1.33	(37)
Artesian Well, Batangas		2.11	(135)
Sinaba Spring, Laguna		1.3	(37)
Mairut Salt Spr., Bontoc	100	none	(37)
Salinas Salt Spring, Nueva Vizcaya	31	0.095	(37)

AFRICA

Source	t°C	mμCl⁻¹ Water
ALGERIA (85)		
Bains de la Reine, near Oran	50	13.1
Louiye, A Hammam Bou Hadjar	44	22.4
Hotel de Vichy, A Bou Hanifia	55	1.3
d'Alma T'zoumoulal	17	5.3

THE LITHOSPHERE

Uranium and Thorium Radioactive Minerals

The numbers following the name of the mineral represent weight percent of U, resp. Th. The qualitative chemical composition is indicated in parentheses ( ), the locality in brackets [ ], R = "rare earths;" aq. = "hydrous."

A. Aeschynite: U 0.3, Th 0–20 ($RNbTiO_x$). *Auerlite:* Th 61 ($ThSiPO_x$). *Autunite:* U 50 ($UCaPO_x$aq.).

B. Becquerelite: U 70 (UO_3aq.) [Belg. Congo] (111). *Blomstrandite:* U 22 ($TaNbUO_x$).

C. Calciothorite: Th 53 ($RCaSiO_x$aq.). *Carnotite:* U 53 ($KUVO_x$aq.). *Chalcolite:* (See Torbernite). *Clevite:* U 60; Th 4 ($UThYO_x$). *Curite:* U 73 ($UPbO_x$aq.) [Belg. Congo] (106).

D. Dewindtite: U 50 ($PbUPO_x$aq.) [Belg. Congo](108). *Dumontite:* U 56 ($PbUPO_x$aq.) [Belg. Congo] (114).

E. Ebigite: *Flutherite* (See Uranothallite). *Eliasite:* also Pittinite (See Gummite). *Erdmanite:* Th 9 ($FeCaThBSiO_x$). *Euxenite:* (Polycrase) U 5–15 ($RNbTaO_x$aq.).

F. Fergusonite: (Bragite, Tyrite, Yttrotantalite) U 1–7, Th 2–5 ($RNbTaO_x$). *Freyalite:* Th 24 ($RThSiO_x$aq.). *Fritzscheite:* ($UMnVO_x$aq.).

G. Gadolinite: Th < 1 ($RO_x.SiO_y$). *Gummite:* (Eliastite, Pittinite) U 60 ($UPbCaSiO_x$aq.).

H. Hatchettolite: U 13 ($UCaNbTaO_x$). *Hokutolite:* ($PbBaSO_4$) [Japan] (42).

J. Johannite: U 56 ($CuUSO_4$.aq.).

K. Kasolite: U 40 ($PbUSiO_x$aq.) [Belg. Congo] (107). *Kochelite:* (See Fergusonite).

L. Liebigite: U 31 ($UCaCO_3$aq.).

M. Mackintoshite: U 20; Th 42 ($RUThSiO_x$aq.). *Medjidite:* (A variety of Uranopilite). *Mendeleeffite:* U 20 ($UNbTiO_x$) [Transbaikalia] (129). *Microlite:* U 1.6 ($CaTaO_x$). *Monazite:* Th 7–20 (RPO_x).

N. Naëgite: U 2.5; Th 45 ($ZrRSiO_x$) [Japan] (42). *Nivenite:* (See Uraninite). *Nohlite:* (See Samarskite).

O. Orangite: U 1–10; Th 65 (A variety of Thorite).

P. Parsonite: U 32 ($PbUPO_x$) [Belg. Congo] (112). *Phosphuranylite:* U 60 (UO_2PO_4aq.). *Pilbarite:* ($PbUThSiO_x$aq.). *Plumboniobate:* U 12 ($PbUYNbO_x$). *Pitchblende:* (See Uraninite). *Polycrase:* (See Euxenite). *Priorite:* (See Blomstrandite). *Pyrochlore:* Th 0–6 ($RCaNbO_x$).

R. Randite: (See Voglite). *Rowlandite:* U 0.4 ($YSiO_x$). *Rutherfordine:* U 65 (UO_2CO_3). *Rutherfordite:* (A variety of Fergusonite).

S. Samarskite: U 1–3 ($RUNbTaO_x$). *Schoepite:* (UO_3CO_3) [Belg. Congo]. *Schrockingerite:* (A variety of Voglite). *Sipylite:* U 3 ($ErNbO_x$). *Soddite:* U 71 ($USiO_x$aq.) [Belg. Congo] (110). *Stasite:* U 50 ($PbOPO_x$aq.) [Belg. Congo] (109). *Skaldowskite:* U 55 ($MgUSiO_x$aq.) [Belg. Congo] (113).

T. Thorogummite: U 18; Th 36 ($UThPbSiO_x$). *Thorianite:* U 12; Th 65 ($RThUO_x$). *Tritomite:* Th 5–8 (Th, Ce, Ca, Ta, B, F, SiO_x). *Torbernite:* U 50 ($UCaPO_x$aq.). *Trögerite:* U 53 ($UAsO_x$aq.). *Tscheffkinite:* Th 1–17 ($RFeSiTiO_x$). *Thysonite:* U 65 ($U(OH)_xSO_4$).

U. Uraninite: (Pitchblende) U 65–80; Th 1–8 (UO_2RUPbO_x). *Uranochalcite:* (A variety of Uranopolite). *Uraconite:* (A variety of Uranopolite). *Uranocircite:* U 47 ($BaUPO_x$aq.). *Uranophane:* U 55 ($UCaSiO_x$aq.). *Uranopolite:* U 64 (UO_2CaSO_4aq.). *Uranosphaerite:* U 42 (UO_2BiOUO_xaq.). *Uranospite:* U 49 ($UCaAsO_x$aq.). *Uranothallite:* U 32 ($CaUCO_3$aq.). *Uranothorite:* U 8; Th 52 ($ThSiO_x$).

V. Voglianite: (A variety of Uranopolite). *Voglite:* U 34 ($CaCuUCO_3$aq.).

W. Walpurgite: U 16 ($BiUAsO_x$aq.).

X. Xenotime: U 3; Th 0–2 (YPO_4).

Y. Yttrocrasite: U 2; Th 0–8 ($YTiO_x$). *Yttrotantalite:* U 0.5–2 ($YNbTaO_x$).

Z. Zuenerite: U 50 ($CuUAsO_x$aq.).

RADIOACTIVITY OF ROCKS

Ra unit = 10^{-12} g Ra (element) per g. Th unit = 10^{-6} g Th (element) per g

IGNEOUS ROCKS

Name and locality	No. specimens	Ra mean	Lit.
Acidic Intrusives			
Charnockite			
Mysore State, India	3	0.09	(121)
Granite			
Mysore State, India	11	1.03	(121)
Dutch East Indies	5	4.9	(13)
Eisenach, Germany	1	3.5	(67)
Germany	7	9.8	(13)
France(1) Holland(2)	3	8.8	(13)
St. Francois Co., Mo., U. S. A	1	1.5	(100)
Ireland	10	2.0	(46)
Leinster, Ireland	28	1.7	(28)
Th mean =	28	7.0	

Name and locality	No. specimens	Ra mean	Lit.
Antartic region	2	0.4	(29)
Th mean =	2	2.6	
South Sea Islands	2	1.76	(26)
Sumatra (1) Bohemia (1)	2	26.1	(35)
Loetschberg Tunnel, Switz	7	2.3	(83)
Various localities	63	2.7	(48)
	1	1.63	(62)
	11	2.56	(123)
Th mean =	86	20.5	(82)
Monzonite			
Bella Monte, Tyrol, Austria	1	3.5	(13)
Pegmatite			
Mysore State, India	2	4.17	(121)
Porphyry			
Campbell Is., New Zealand	1	2.8	(26)
Various localities	10	2.8	(13)
Quartz			
Germany	3	16.0	(13)
Sumatra	1	1.3	(13)
Syenite			
Borneo and Molucca Island	13	1.58	(13)
Mount Royal, Canada	1	1.1	(25)
Vosges, France	1	13.2	(36)
Norway	3	2.46	(123)
Various localities	8	8.3	(13)
	23	3.9	(48)
Tinguaite			
Mount Royal, Canada	2	3.65	(25)
Tinguaite porphyry			
Germany	2	8.2	(13)
Basic Intrusives			
Diabase			
Borneo	2	0.85	(13)
Diabases and dolerites	8	1.0	(48)
New Zealand	1	0.43	(26)
Diabase and gabbro			
Germany	5	2.8	(13)
Diorite			
Borneo and Sumatra	4	0.78	(13)
Various localities	8	1.6	(48)
Dolerite			
Isle of Canna, Scotland	1	0.57	(123)
New Zealand	2	0.66	(26)
Dunite			
Loch Scavaig, Scotland	1	0.31	(123)
Essexite			
Mount Royal, Canada	1	0.26	(25)
Gabbro			
New Zealand	2	0.34	(26)
Gabbro and Norite	5	1.3	(48)
Greenstone			
Garrick Du, St. Ives, Eng.	1	0.52	(123)
Hypersthenite	1	0.06	(121)
Peridotite			
Isle of Rum, Scotland	1	0.63	(123)
Porphyry			
New Zealand	1	0.99	(26)

Name and locality	No. specimens	Ra mean	Lit.
Acid Extrusives			
Ash			
Krakatoa near Sumatra Th mean =	1	9.0	(82)
Kenyte			
Antartic region	4	2.29	(29)
Th mean =	4	12.0	
Lavas			
Various localities	18	3.4	(43)
Th mean =	15	24.0	
Liparite	2	4.7	(13)
Phonolite			
Kirchberg, Germany	1	0.9	(13)
Pitchstone			
Auckland Island, New Zealand	1	1.9	(26)
Dutch East Indies	2	0.6	(13)
Isle of Eigg, Scotland	1	1.53	(123)
Meissen, Germany	1	3.0	(13)
Rhyolite			
Yellowstone Park, U. S. A.	6	2.21	(104)
Trachite			
Mt. Erebus, Antartic region	3	2.16	(29)
Th mean =	3	13.0	
Continental Europe	2	3.4	(13)
New Zealand	3	2.11	(26)
Transandine Tunnel	7	0.58	(27)
Th mean =	7	4.4	
Various localities	18	3.0	(48)
Tuff	2	2.9	(46)
Transandine Tunnel	12	0.92	(27)
Th mean =	10	5.87	
Basic Extrusives			
Anamesite			
Germany	2	1.8	(13)
Andesite			
Borneo and Molucca Is.	13	1.58	(13)
Basalt			
Deccans and Antartic	14	2.0	(48)
Mt. Erebus, Antartic region	1	2.13	(29)
Th mean =	1	14.5	
Hebrides (mainly)	11	0.5	(48)
New Zealand	2	1.21	(26)
Various localities	6	0.47	(123, 125)
	6	2.2	(46)
	4	0.35	(126)
Lava			
Antartic region	7	0.58	(29)
Th mean =	7	4.7	
Vesuvius (1631–1906)	7	12.6	(43, 46)
Th mean =	6	53.4	(82)
Limburgite			
Germany	1	2.9	(67)
Melaphyre			
Oberstein, Germany	1	1.9	(13)
Tepharite	3	8.7	(67)
Trap			
Mysore State, India	43	0.21	(121)

METAMORPHIC ROCKS

Name and locality	Ra		Th		Lit.
	No. specimens	Mean	No. specimens	Mean	
Amphibolite India					
Mysore State	1	0.82			(121)
Gneiss					
Freiburg, Ger	1	2.9			(67)
Various localities	14	2 1	14	8 7	(48, 82)
Gneiss (granitic)					
Tauern Tunnel	11	3.41	7	17.7	(62)
Gneiss (porphyritic)					
Tauern Tunnel	9	4.34	9	41 0	(62)
Quartzite					
Various localities			6	3 4	(45)
Villnos Gulch, Austria	1	54.7	1	5.79	(133)
Schist					
Lustre, Simplon Tunnel			1	10 4	(45)
St. Gothard Tunnel	33	3.4	33	11.6	(47)
Schist (chlorite)					
Mysore St., India	1	0 27			(121)
Schist (hornblende)					
Mysore St., India	11	0.19			(131)
From mines, Mysore St., India	17	0.25			(121)
Slate					
England	2	1.17			(124)
European			10	13.5	(45)
Germany	2	1.3			(13)
Tauern Tunnel	3	2.53	3	24 3	(62)
Slate (mica)					
From well boring, Beachville, Can.	1	1 6			(25)

SEDIMENTARY ROCKS

Name and locality	No. specimens	Ra mean	Th mean	Lit.
Clay				
Montreal, Canada	2	1 17		(24)
England	3	0.79		(124)
England(1), Germany(1)	2		10 2	(45)
Coal				
Alabama, U. S. A.	11	0 166		(55)
Lens, France	1	0 97	3 3	(74)
Frankenholz	1	0 04	0 3	(74)
Coal ash				
Alabama coals	11	2.15		(55)
Lens, France	1	8.8	30.	(74)
Frankenholz	1	2 0	15.	(74)
Flint				
Terling, Essex, Eng	1	0 49		(124)
Grauwacke				
Wipperfurth, Germany	1		24.	(45)
Limestone				
Beachville, Ont., Can	6	1 02		(25)
Montreal, Canada	2	0 91		(25)
Deccan, India	1	0.25		(124)
England	7	1.13		(124)
Germany(2), Ireland(1)	3		2 3	(44)
New Zealand	2	0.37		(26)
Various localities	30		0.4	(44)

Name and locality	No. specimens	Ra mean	Th mean	Lit.
Limestone (oölithic)				
Yellowstone Park, U. S. A.	2	2.9		(104)
Marble and limestone				
Various localities	8	1.3		(13)
Sand (Saxicava)				
Montreal, Canada	1	0.16		(24)
Sandstone	2	1.04		(124)
From 850 ft. borehole, Baarlo, Limburg, Holland	8	1.66		(13)
Beachville, Canada	1	0.50		(25)
Various localities	8		6.3	(45)

OCEANIC DEPOSITS

Name and locality	No. specimens	Ra mean	Lit.
Blue mud			
1240 fa. E. coast N. Amer	1	3.1	(138)
Calcareous mud			
2225 fa. E. of Society Islands	1	22.2	(138)
Globergina ooze			
1990 fa. Middle S. Atlantic	2	6.5	(138)
1825 fa. Pacific W. of South America	1	7.4	(138)
570 fa. W. coast Ireland	2	6.3	(138)
2012 fa. Central Pacific	2	7.6	(138)
Radiolarian ooze			
Central Pacific	4	43.9	(138)
Red clay			
2740 fa. N. Atlantic, coast of Africa	4	17.6	(138)
2350 fa. Central Pacific	3	47.4	(138)
"Salt Lime" (gypsum from evap. sea water)	1	0.016	(130)
Sea Salt	1	0.07	(124)
From evap. water of high seas	15	none	(40)

SOILS

Gravel—fine siftings			
Terling, Essex, Eng	2	0.65	(124)
Surface loams			
7 localities in E. and S. parts of U. S.	7	1.97	(69)
Th mean =	5	4.5	(69)
Subsoils of above	7	1.52	(69)

Highest value for surface soils, 2.88; Lowest, 0.93	(69)
Highest value for subsoil, 3.8; Lowest 0.93	(69)
Loess, Heidelberg, 10.4 × 10^{-6} g Th per g	(45)
Mark, Ireland, 1.4 × 10^{-6} g Th per g	(45)

ROCKS FROM TUNNELS

Rock and section of tunnel	No. of specimens	Units	
		10^{-12} g Ra per g	10^{-6} g Th per g
The St. Gothard (47)			
Granites and gneiss			
Finsteraarhorn Massif	20	6.7	21.5
Altered sediments			
Unsernmulde	18	3.8	13.4
Tessinmulde	18	2.7	4.8
Schists, etc.			
St. Gothard Massif	33	3.4	11.6
The Tauern, Austria (62)			
Granitic gneiss	Ra 10, Th 7	3.41	17.7
Porphyritic granitic gneiss	Ra 13, Th 9	4.34	41.0

Rocks from Tunnels.—*(Continued)*

Rock and section of tunnel	No. of specimens	Units	
		10^{-12} g Ra per g	10^{-6} g Th per g
Slate	Ra 3, Th 3	2.53	24.3
The Loetschberg, Bernese Oberland, Switzerland(83)			
Anhydrite	2	3.4	
Aplete	2	2.5	
Granite	7	2.3	
Limestone	16	1.5	
Quartz porphyry	1	2.5	
Quartz sandstone	1	4.3	
Schists			
Feldspathic	3	2.7	
Hornblende	2	3.1	
Lustre	2	3.4	
Mica	2	2.1	
Quartz	12	2.4	
Talc	16	1.5	
(Unclassified)	16	2.5	
The Transandine, Argentine-Chile (27)			
Andesites	Ra 2, Th 1	0.71 0.79	4.1 5.6
Mean Ratio, Th-Ra = 7 × 10^6			
Feldspathic Tuff	2	1.24	3.0
Trachytes	7	0.58	4.4
Tuff	Ra 8, Th 7	0.90	6.94

SPRING DEPOSITS

Country, name of spring, location	No. of specimens	Ra content*	Th content†	Remarks	Lit.
Austria					
Elizabethstollen, Gastein	1	2920	3970	Reissacherite	(62)
Rudolphstollen, Gastein	1	417, 300	1988		(62)
Vilnos Gulch	4	75	37.7	A sinter	(133)
England					
Hot Springs, Bath	1	381			(124)
France					
Chomel, Vichy	1	250		Ferruginous	(52)
Hôpital, Vichy	1	700		Black	(52)
Carnot, Santenay	1	1500			(52)
Neris	1	950	5100	Black	(52)
Luxeuil	1	660	1100	Manganous	(52)
Germany					
Badochquelle	1	4		Surface scum	(67)
Ems, Hessen-Nassau	4	0.63	35		(133)
Johanngeorgenstadt, Saxony.	3	681	89	Mainly hydromorphite; Range of Ra content, 10-1300	(4)
Italy					
Fiuggi	1	5		Tufa	(84)
Russia	2	13.9	147		(14)
Borzhom Spring	2	13.9	147		(14)
United States					
Hatborn No. 1, Saratoga Springs, N. Y	1	769			(71)
Geyser, Saratoga Springs, N. Y	1	17			(71)
Pump Well No. 4, Saratoga Springs, N. Y	1	63			(71)
Palace Spring, Hot Springs, Arkansas	1	1724			(99)
Avenue Spring, Hot Springs, Arkansas	1	140			(99)
Horseshoe Spring, Hot Springs, Arkansas	1	2.3			(99)
Various springs, Hot Springs, Arkansas	11	175			(99)
Main Springs, Mammoth Hot Springs, Yellowstone	1	8.8		Travertine	(104)
Hot River, Mammoth Hot Springs, Yellowstone	1	8.1			(104)
Bench Springs, Upper Geyser Basin, Yellowstone	1	0.95			(104)
Fish Cone, West Thumb, Yellowstone	1	0.19			(104)
Fire Hole Lake, Lower Geyser Basin, Yellowstone	1	6.7			(104)
Doughty Springs, Delta Co., Colorado	2	1654			(100)

* Unit, 10^{-12}g Ra per g.
† Unit, 10^{-6}g Th per g.

METEORITES

Class and locality	Ra in 10^{-12} g per g	Remarks	Lit.
Stony			
Dhurmsala, India	0.53		(123)
Coahuila, Coahuila, Mex.	7.69	Normal hexahydrite	(87)
Toluca, Xiquepeleo, Mex.	0.21	Medium octahedrite	(87)
Iron			
Augusta Co., Va., U. S. A.	0.0022		(125)
	none	2 specimens	(123)
Stone			
Various localities	0.75	Mean of 16 Range 2.17-0.073	(87)
Iron			
Various localities.	0.69	Mean of 2	(87)
	none	Mean of 3	(87)

NATURAL GASES

Source and Locality	No. samples	Millimicro-Curies (10^{-9} Curies) Ra per liter	Lit.
Canada			
Medicine Hat, Alberta	3	0.064	(97)
Suffield-Brooks Calgary	6	0.064	(97)

Source and Locality	No. samples	Millimicro-Curies (10^{-9} Curies) Ra per liter	Lit.
3 British Columbia wells		0.47	(97)
Brant, Anondoga, Ontario	4	0.42	(97)
Tilbury, Ontario		0.016	(97)
England			
Marsh gas, environs of Cambridge	10	0.3	(95)
France			
Alsace		7.1	(17)
Germany			
Nuengamme, Hamburg		0.24	(17)
Hungary			
Well No. 14, Bazna		0.043	(17)
Japan			
Well No. 22, Takiya		0.035	(42)
Rumania			
Well No. 103, Campina			(17)

LITERATURE

(For a key to the periodicals see end of volume)

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(10) Borne, *200*, **2**: 77, 142, 05 (11) Boyle and McIntosh, *69*, **7**: 163; 13 (12) Brochet, *34*, **150**: 145, 291, 10. (13) Büchner, *200*, **10**: 516, 23 (14) Burkser, *53*, **47**: 21, 14 (15) del Castillo and de Rada, *132*, **11**: 236; 12. (16) Curie and Laborde, *34*, **142**: 1162, 06 (17) Czako, *93*, **82**: 249; 13. (18) Danne and Crémieu, *34*, **153**: 870; 11 (19) Dole, *U S Geol. Survey, Mineral Resources*, **2**: 393, 13

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(50) Koch, *63*, **7**: 806; 06. (51) Kolhörster, *86*, **14**: 356; 12. (52) Laborde and Lepape, *34*, **155**: 1202; 12 (53) Lepape, *34*, **176**: 1702; 23. (54) Lester, *12*, **46**: 621, 18. (55) Lloyd and Cunningham, *11*, **50**: 47; 13. (56) Loisel, *34*, **173**: 921; 21. **173**: 890; 22. (57) Loisel and Castelnau, *34*, **173**: 1390; 21. (58) Loisel and Michailesco, *34*, **175**: 1054; 22. (59) Ludwig, *63*, **25**: 180, 24.

(60) Mache, *75*, **113**: 1329, 04 (61) Mache, *75*, **132**: 207; 24. (62) Mache and Bamberger, *75*, **123**: 325; 14. (63) Mache and St. Meyer, *75*, **114**: 355; 05 (64) Makower, *135*, **106**: 130; 12 (65) Massol, *34*, **155**: 373; 12 (66) Mauchly, *268*, **29**: 187, 24. (67) Meyer, *190*, **1**: 184; 16. *270*, **20**: 1, 14 (68) Mesernitsku, *53*, **43**: 244, 11 (69) Moore, *45*, **6**: 370; 14.

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(80) Perret and Jacquerod, *149*, **45**: 277, 336, 418, 18. (81) Pinto, *C. R. Cong Int Radiol and Elect*, **1**: 79, 11. (82) Poole, *3*, **29**: 483; 15. (83) Poole, *3*, **40**: 466, 20 (84) Porlezza and Norzi, *22*, **20**: 935; 11. (85) Pouget and Chouchak, *34*, **177**: 1112, 1319, 23. (86) Poulsson, *137*, No. **8**; 14 (87) Quirke and Finkelstein, *12*, **44**: 237; 17. (88) Ramsay, *135*, **105**: 134, 12 (89) Ramsay, *12*, **40**: 309, 15.

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(120) Skinner and Sale, *45*, **14**: 949; 22. (121) Smeeth and Watson, *3*, **35**: 206, 18 (122) Steichen, *3*, **31**: 401, 16 (123) Strutt, *5*, **77A**: 472; 06. (124) Strutt, *5*, **78A**: 150, 06. (125) Strutt, *5*, **80A**: 572; 08. (126) Strutt, *5*, **84A**: 377; 10. (127) de Sury, *149*, **24**: 101; 07. (128) Szilard, *34*, **154**: 982, 12. (129) Vernadsky, *34*, **176**: 993; 23.

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AGES OF MINERALS AND ROCKS BASED ON RADIOACTIVE CHANGES

ROGER C. WELLS

There are a number of ways of estimating the ages of minerals by combining chemical and radioactive data, all based on the assumption that the law of each radioactive change is expressed by its constant, λ, over the periods and for the quantities of each element involved. The two principal methods employ the ratios of helium to uranium and thorium and of lead to uranium and thorium. The helium ratio is admitted to give minimum values on account of the loss of helium with lapse of time; and the lead ratio involves the assumption, or actual proof by means of an atomic weight determination, that the lead is wholly of radioactive origin. Associated rocks are generally assumed to be as old or older than the minerals found in them. Attempts have also been made to calculate the ages of rocks from determinations on bulk samples (Russell).

For the two methods mentioned the fundamental changes and data are:

$$\mathrm{U}(238.17) \rightarrow \mathrm{Pb_U}(206.06) + 8\mathrm{He}(4.00)$$

$$\mathrm{Th}(232.15) \rightarrow \mathrm{Pb_{Th}}(208.00) + 6\mathrm{He}(4.00)$$

One gram of uranium in equilibrium with its products gives 9.4×10^4 alpha particles per sec (15) or 1.96×10^{-11} gram He and 1.26×10^{-10} gram $\mathrm{Pb_U}$ per year.

One gram of thorium in equilibrium with its products gives 2.7×10^4 alpha particles per sec, or 5.5×10^{-12} gram He and 4.8×10^{-11} gram $\mathrm{Pb_{Th}}$ per year.

The ages of minerals may be calculated from the analytical data and the preceding information by simple proportion in the case of helium (equation 1) and also in the case of lead with sufficient accuracy for most purposes (equation 2), but if the percentage of lead is relatively large the theoretical relation is given by equation 3, where U, Th, Pb = percentage U, Th, Pb in the mineral.

$$(1)\quad \text{Age} = \frac{\text{cm}^3\ \text{He/g}}{\text{U} + 0.28\text{Th}} \times 910 \text{ million years}$$

(2) $$\text{Age} = \frac{\text{Pb}}{\text{U} + 0.38\text{Th}} \times 7900 \text{ million years}$$

(3) $$\text{Age} = \frac{\log(\text{U} + 0.38\text{Th} + 1.156\text{Pb}) - \log(\text{U} + 0.38\text{Th})}{6.5 \times 10^{-5}}$$

million years

Thorium minerals with Th/U greater than 3 are secondary and younger than uranium minerals from the same geolo horizon(19). Low lead ratios have little significance on accou of the ease with which certain minerals abstract lead from cir lating natural waters. The atomic weight of the lead should determined whenever possible in order to make certain that t lead is of radioactive origin. In general, only primary minerals suitable for age determinations.

Ages of Minerals from Helium Ratios by Equation (1)

(The values in parenthesis are calculated from the lead ratios for comparison)

Mineral	Geologic horizon	He cm³/g	U Percent	Th Percent	Age million years	Lit
Phosphatic shark's teeth, Florida	Pliocene	1.7×10^{-6}	0.021	0	0.07	(23
Phosphatic shark's teeth, Felixtowe, Eng	Pliocene	1.6×10^{-6}	0.013	0	0.11	(23
Phosphatic nodules, Felixtowe, Eng	Pliocene	1.0×10^{-6}	0.0041	0	0.22	(23
Carnotite, Montrose Co., Colo.	Post Tertiary	0.01	2.53	0	3.6	(23
Zircon, Campbell I., New Zealand	Tertiary	8.1×10^{-5}	0.029	0.07	1.5	(23
Pitchblende, Joachimsthal		0.107	62.4	0	1.6	(23
Sphaerosiderite, Germany	Oligocene	1.65×10^{-6}	0.00015	0.00017	7.6	(23
Zircon, Mayen, Eifel	Tertiary	1.14×10^{-4}	0.0108	0.00073	9.4	(23
Hematite, Co. Antrim, Ireland	Eocene	1.21×10^{-5}	0.00022	0.00073	26	(23
Zircon, Auvergne	Tertiary	2.12×10^{-4}	0.031	0	6.2	(23
Phosphatic nodules, Cambridge, Eng	Upper Cretaceous	3.0×10^{-6}	0.0091	0	3.0	(23)
Phosphatic nodules, Bedfordshire	Lower Cretaceous	2.1×10^{-5}	0.0049	0	3.9	(23)
Zircon, Cheyenne Canon, Colo.	Paleozoic	0.0193	0.109	0.10	128	(23)
Hematite, Cumberland, Eng	Above Carboniferous	1.6×10^{-4}	0.0011	0	130	(28)
Limonite, Forest of Dean	Carboniferous	1.5×10^{-4}	0.00087	0.00043	140	(23)
Sipilite, Little Frier Mt., Va	Carboniferous (?)	0.59	2.42	4.33	147	(23)
Euxenite, Arendal, Norway	Pre-Cambrian	0.73	2.41	2.39	210(1240)	(23)
Samarskite, Mitchell Co., N. C.	Carboniferous (?)	1.5	8.73	1.28	160	(23)
Phosphatic nodules, Bala, England	Silurian	1.5×10^{-4}	0.0028	0	49	(23)
Phosphatic limestone, Chirbury, Shropshire, Eng	Silurian	5.6×10^{-6}	0.0067	0	76	(23)
Uraninite, Katanga	Pre-Silurian	8.88	77.76	0	104(665)	(4)
Zircon, Brevig, Norway	Post-Devonian	0.0099	0.113	0.288	46	(23)
Hematite, Caen	Devonian	9.8×10^{-5}	0.00037	0.0013	120	(23)
Zircon, Green River, N. C.	Paleozoic	0.0255	0.11	0.264	126	(23)
Zircon, Ural Mts.	Paleozoic	0.030	0.0538	0.408	160	(23)
Uraninite, Colo.	Tertiary	0.15	72.62		18(58)	(11)
Uraninite, N. C.	Post-Cambrian	2.96	77.0	2.44	34(380)	(11)
Thorianite, Sab. Province, Ceylon	Pegmatite in Charnokite Series	1.5	9.87	63.54	50(460)	(5)
Thorianite, Galle Province, Ceylon	Pegmatite in Pre-Cambrian	9.3	20.6	57.55	230(400)	(23)
Uraninite, Ånneröd	Pre-Cambrian (?)	9.4	66.2	5.27	120(890)	(11)
Uraninite, Portland, Conn.	Devonian (?)	19.2	72.0	8.79	230(290)	(11)
Uraninite, Branchville, Conn.	Silurian (?)	21.0	74.3	5.72	250(400)	(11)
Microlite, Amelia Court House, Va	Carboniferous (?)	0.05	1.60	0	280	(23)
Cuprouranite, Cornwall	Devonian	0.10	50.9	0	1.8	(23)
Orangite, Brevig, Norway	Middle Devonian	0.11	0.85	42.6	7.9(22)	(23)
Zircon, Ural Mts	Paleozoic	0.030	0.053	0.409	160	(23)
Thorianite, Ceylon	Balangoda series	8.9	11.0	67.7	270(500)	(23)
Zircon, Kimberly	Paleozoic	0.032	0.091	0.012	310	(23)
Phosphatic nodules, Loch Broom	Pre-Cambrian	8.3×10^{-4}	0.084	0	9.0	(23)
Gadolinite, Ytterby	Pre-Cambrian (?)	2.43	2.50	7.56	480	(23)
Aeschynite, Ural Mts		0.98	2.12	7.19	210	(23)
Cyrtolite, Llano Co., Texas	Pre-Cambrian (?)	1.15	3.11	4.44	240	(23)
Uraninite, S. Dak	Pre-Cambrian (?)	4.35	66.90	1.89	59(540)	(4)
Zircon, Ceylon	Ancient	0.0283	0.086	0.010	290	(23)
Zircon (?), Renfrew Co., Ontario	Archaean	0.0114	0.0155	0.0008	660	(23)
Aeschynite, Hitteroe, Norway		1.09	7.98	1.11	1200	(23)

AGES OF MINERALS FROM LEAD RATIOS BY EQUATION (3)

Mineral	Geologic horizon	Pb Percent	U Percent	Th Percent	Th/U	Age million years	Lit.
Carnotite, Montrose Co., Colo	Tertiary	0.17	45.6			29	(12)
Johannite, Colo	Tertiary	0.76	47.2			123	(18)
Brannerite, Idaho	Tertiary	0.18	46.97	4.1	0.11	29	(9)
Uraninite, Gilpin Co., Colo	Tertiary	0.65	72.60			69	(11)
Thorite, Ceylon	Young mineral in pegmatite in Pre-Cambrian	2.86	72.00	8.79	0.12	280	(11)
Hatchettolite, Hybla, Ont	Pre-Cambrian (?)	0.50	13.72	0.46	0.03	270	(24)
Polycrase, Brazil	Pre-Devonian	0.59	5.49	4.59	0.84	600	(8)
Allanite, Blueberry Mtn., Mass	Young mineral in pegmatite	0.036	0.11	2.01	18.3	310	(17)
Freyalite, Brevig, Norway	Post-Devonian (Lawson)	0.0028	0.0526	6.330	120.3	8.8	(19)
Tritomite, Brevig, Norway	Post-Devonian (Lawson)	0.0026	0.0631	5.150	81.6	9.9	(19)
Thorite, Brevig, Norway	Post-Devonian (Lawson)	0.0196	0.4072	29.20	71.7	13.3	(19)
Thorite, Brevig, Norway	Post-Devonian (Lawson)	0.0810	0.7200	49.43	68.6	32.0	(19)
Thorite, Brevig, Norway	Post-Devonian (Lawson)	0.0760	0.7000	47.25	67.5	31.4	(19)
Orangite, Brevig, Norway	Post-Devonian (Lawson)	0.0570	1.2437	49.44	39.7	22.1	(19)
Orangite, Brevig, Norway	Post-Devonian (Lawson)	0.0542	1.1825	45.03	38.1	22.8	(19)
Homolite, Brevig, Norway	Post-Devonian (Lawson)	0.0121	0.2442	2.900	11.9	69.1	(19)
Mosandrite, Brevig, Norway	Post-Devonian (Lawson)	0.0024	0.0432	0.287	6.64	112	(19)
Eudidymite, Brevig, Norway	Middle Devonian	0.0007	0.0090	0.036	7.00	230	(19)
Eucolite, Brevig, Norway	Middle Devonian	0.0012	0.0170	0.040	2.35	280	(19)
Thorite, Brevig, Norway	Middle Devonian	0.4279	10.1040	14.20	1.41	210	(19)
Zircon, Brevig, Norway	Middle Devonian	0.0055	0.1460	0.114	0.78	220	(19)
Zircon, Brevig, Norway	Middle Devonian	0.0085	0.1941	0.082	0.42	280	(19)
Pyrochlore, Brevig, Norway	Middle Devonian	0.0093	0.1855	0.075	0.40	330	(19)
Aegerine, Brevig, Norway	Middle Devonian	0.0015	0.0253	0.007	0.28	400	(19)
Zircon, Brevig, Norway	Middle Devonian	0.0370	0.9310	0.141	0.15	280	(19)
Biotite, Brevig, Norway	Middle Devonian	0.0069	0.1602	0.017	0.11	310	(19)
Uraninite, Spruce Pine, N. C	Post-Cambrian (?)	3.90	77.01	2.44	0.03	380	(11)
Thorianite, Galle Province, Ceylon	Pegmatite in Pre-Cambrian	2.41	24.13	55.95	2.32	400	(19)
Betafite, Madagascar	Pegmatite, uncertain	0.35	22.58	0.98	0.04	120	(16)
Thorianite, Sa. Province, Ceylon	Pegmatite in Pre-Cambrian	2.09	9.87	63.54	6.45	460	(5, 19)
Uraninite, Branchville, Conn	Silurian (?)	4.03	73.00	6.09	0.81	400	(11)
Uraninite, Katanga	Pre-Silurian	6.51	77.76	0		620	(4)
Polycrase, Slättåkra, Sweden		0.85	8.45	3.08	0.36	650	(2)
Uraninite, Ånneröd, Norway	Pre-Cambrian (Moss district)	8.39	66.21	5.28	0.08	890	(11)
Uraninite, Elvestad	Pre-Cambrian (Moss district)	9.35	65.82	7.46	0.11	970	(11)
Ånnerödite	Pre-Cambrian (Moss district)	2.22	15.25	2.08	0.14	990	(2)
Mackintoshite, Llano Co., Tex	Pre-Cambrian (?)	3.47	19.75	39.83	2.02	730	(1)
Yttrocrasite, Llano Co., Tex	Pre-Cambrian (?)	0.45	2.28	7.69	3.38	640	(1)
Uraninite, Llano Co., Tex	Pre-Cambrian	9.43	56.45	6.65	1.18	1130	(1)
Uraninite, Llano Co., Tex	Pre-Cambrian	9.35	55.18	5.88	1.07	1150	(1)
Yttrialite, Llano Co., Tex	Pre-Cambrian	0.74	1.45	9.53	6.5	1040	(1)
Yttrialite, Llano Co., Tex	Pre-Cambrian	0.79	0.69	10.55	15.3	1190	(1)
Fergusonite, Ytterby, Sweden	Middle Pre-Cambrian	0.18	1.06			1200	(1)
Gadolinite, Ytterby, Sweden	Middle Pre-Cambrian	0.36	2.41			1100	(1)
Zircon, Ceylon	Pre-Cambrian	0.092	0.56	0.01	0.02	1150	(14)
Uraninite, Villeneuve, Quebec	Middle Pre-Cambrian	10.46	64.74	6.41	1.00	1110	(11)
Uraninite, Parry Sound, Ontario	Middle Pre-Cambrian	10.83	69.19	2.83	0.04	1090	(6)
Uraninite, Arendal, Norway	Pre-Cambrian (Arendal district)	10.16	61.27	3.65	0.06	1150	(11)
Uraninite, Black Hills, S. Dak	Pre-Cambrian	15.24	66.90	1.89	0.03	1540	(4)

LITERATURE

(For a key to the periodicals see end of volume)

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SELECTED PHYSICAL PROPERTIES OF STARS AND NEBULAE

ALFRED H. JOY

CONTENTS.—(*A*) Classification of stellar and nebular spectra; (*B*) Stellar temperatures, masses, and densities; (*C*) Stellar diameters. (Data pertaining to the solar spectra will be found with other spectroscopic data; consult index)

A. CLASSIFICATION OF STELLAR AND NEBULAR SPECTRA

The system[1] is that developed at Harvard College Observatory, as used by Miss Cannon in the Henry Draper Catalogue. Except where the exact nature of the spectral changes is not fully understood, decimal sub-classes, representing progressive steps toward the succeeding class, are used. In denoting objects by their catalogue numbers, the following abbreviations are used: B. D. = Bonn Durchmusterung; C. D. M. = Cordoba Durchmusterung; I. C. = Dreyer's Index Catalogue of nebulae and clusters; N. G. C. = New General Catalogue by Dreyer. The number, or numbers, following the abbreviation is the catalogue designation of the object.

Class P includes practically all the gaseous nebulae. Its unique characteristic is the appearance of lines from an unknown origin (nebulium). In addition there are many lines of H, He, C, He+, C+, and N+. All lines are bright and usually sharp. (The order of the Harvard (2) subdivisions should probably be reversed to indicate decreasing intensity of radiation)

Class	Typical object	Spectral criteria
Pa	I. C. 418	λ5007 and λ4959 faint, λ3869 not seen
Pb	Orion nebula	λ5007 and λ4959 stronger
Pc	I. C. 4997	λ4363 conspicuous
Pd	N. G. C. 6826	λ5007 and λ4959 strong
Pe	N. G. C. 7662	λ4686 present
Pf	N. G. C. 40	λ4686 strong

Wright (11) has divided these spectra into three classes: Class I, having λ4686 present, Class II, with λ4686 absent but λ3869 present, and Class III with both λ4686 and λ3869 absent.

Class O is distinguished by the presence of the Pickering series of ionized helium, upon a strong continuous spectrum with maximum intensity far in the violet. The elements present are H, He, He+, C+, N+, Mg+, O+, CIII, NIII, SiIII, OIII, SiIV. Broad emission bands occur in the earlier subdivisions. Few absorption lines are found in sub-classes Oa, Ob, Oc, which make up the group known as Wolf-Rayet stars. (The Harvard subclasses Od, Oe, and Oe5 which have absorption lines and in some cases narrow emission lines as well, are included in the subclasses O5 to O9 as suggested by H. H. Plaskett (7), the basis of classification being the absorption lines.)

Class	Typical object	Spectral criteria
Oa	B D. +35° 4013	Band λ4648 stronger than λ4686
Ob	B. D. +35° 4001	λ4686 stronger than λ4648
Oc	C. D. M. −41° 10972	Bands narrower. λ4686 twice λ4638
O5	B. D. +4° 1302	Pickering series very strong. H lines weak, λ4634 and λ4640 (NIII) present
O6	B D. +44° 3639	Neutral helium appears
O7	9 Sagittae	λ4471 (He), 1.4 × λ4541. λ4089 (SiIV), 0.8 × λ4097 (NIII)
O8	λ Orionis	λ4481 (Mg+) appears
O9	10 Lacertae	H stronger, He weak. λ4471, 2.7 × λ4541. λ4089, 1.4 × λ4097

Class B is characterized by the presence of helium, which has its maximum intensity in B2. The principal elements are those of class O, with the addition, in the later sub-classes, of lines of the ionized atom of several of the metals, such as Sr, Ba, and Fe. The H and K lines of calcium are found in increasing strength in this class. The hydrogen lines increase through the sub-classes, reaching a strong maximum at Ao of the following class.

Class	Typical object	Spectral criteria
B0	ζ Orionis	Pickering series weak, λ4649 (OII), λ4116 (SiIV), and λ4089 (SiIV) maximum intensity
B1	β Canis Majoris	He more prominent than O and Si.
B2	γ Orionis	λ4116 not seen. λ4089 and λ4649 faint
B3	η Aurigae	Strongest lines are helium
B5	q Tauri	λ4128 and λ4131 (SiII) stronger than λ4121 (He). λ4481, 0.7 × λ4471
B8	β Orionis	λ4481 equal to λ4471
B9	λ Aquilae	H strong. He weak. Several prominent enhanced metallic lines

Classes A, F, G, K and M, which contain the largest numbers of the stars, show a gradual increase in the number and intensity of the lines of neutral metallic elements of the lower atomic weights, and a decrease in the intensity of lines due to ionized elements. Compounds produce bands in the later classes. The sun's spectrum is Go, and is intermediate between that of the white and the red stars.

Class	Typical object	Spectral criteria
Ao	α Lyrae	H maximum strength. Very few other lines except λ4481 (Mg+)
A5	ρ Sagittarii	K (Ca+) stronger than Hδ. λ4290 well marked. λ4481 weaker
Fo	σ Bootis.	K 3.0 × Hδ and equal to H + Hε

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[1] Adopted by International Astronomical Union. It defines a temperature scale which is linear within the present errors of measurement

Class	Typical object	Spectral criteria
F5	*α* Canis Minoris	Fraunhofer band G first seen. Numerous solar lines
Go	*α* Aurigae	Solar type. H not conspicuous. G band well defined, Hδ = λ4226.
G5	*η* Piscium	Hγ fainter than λ4325
Ko	*α* Bootis	G band conspicuous, λ4226 strong. Hydrogen weaker
K5	*α* Tauri	λ4226 very wide. λ4254 and λ4274 (Cr) strong. Titanium bands very faint
Mo	*β* Andromedae	Titanium bands well marked
M5	*α* Herculis	Titanium bands very stong Metallic lines fewer

Class R and N stars show the carbon bands in increasing strength. The more advanced stars of class N have very little light in the violet or blue portions of the spectrum. They are the reddest stars known. Typical stars: Class R, B. D. −10° 5057; Class N, 19 Piscium.

Class S spectra resemble those of class K5 except for the presence of bands of zirconium, and other peculiarities in the region near λ4650. The line λ4554 of Ba+ is conspicuous

Class Q stars are the novae. Near maximum of outburst their spectra are characterized by numerous wide emission bands of hydrogen and helium, and by absorption lines of ionized elements, especially titanium and iron. As the star decreases in light, both absorption and emission lines of N and O become more prominent In the later stages, bright nebular bands appear; these are ultimately superseded by the bright bands of the Wolf-Rayet spectrum.

B. STELLAR TEMPERATURES, MASSES, AND DENSITIES

Giant stars are characterized by large mass, low density, and great total luminosity. Dwarf stars have smaller mass, higher density, and less total luminosity. Both are found in all classes, but the greatest contrasts between the two are found in the cooler stars of classes K and M. The continuous spectrum of dwarfs has its maximum shifted towards the violet, as compared with that of giants of the same spectral class, indicating that their absolute temperature is about 15% higher than that of the giants. Even with small dispersion, pronounced differences between giants and dwarfs may be noticed in the distribution of intensity in their line spectra. These differences probably arise from differences in the density gradients; they show a correlation with the absolute magnitude and mass of the stars. The low densities of giants favor the enhancement of those lines (absorption) which are produced under conditions of high excitation, such as the spark lines of the metals; the high density of dwarfs favor those produced by low excitation, such as the resonance lines of neutral atoms. The lines λ4077, λ4215 (ionized Sr) are much strengthened in giants, and weakened in dwarfs; the reverse is true of λ4226 (Ca), λ4454 (Ca), λ4607 (Sr).

STELLAR TEMPERATURES, MASSES AND DENSITIES

Units: Temperature, 1000°C abs.; Mass, Mass of Sun; Density, g/cm³.

Class	Effective temperature (giants*)					Mean mass (9)		Mean density (9)	
	A†	P‡	C§	S‖	F¶	Giants	Dwarfs	Giants	Dwarfs
Oa		23		23					
O5					30	50 (6)			
Bo		20	13	18	19	10			
B3					16	9		0.22	
B8	16					7.3		0.24	
Ao	14	11	8	12	10	7.0	6.0	0.16	0.36
A5		9				5.6	4.0	0.071	0.40
Fo		7.5		9	7.5	4.3	2.5	0.025	0.40
F5	6	7.2	6			3.2	1.5	0.0078	0.39
Go	5.8	6.5	6	7	6	2.6	1.0	0.0025	0.68
G5		4.5				2.8	0.76	0.000 87	1.2
Ko		3.7	4		4.5	3.0	0.68	0.000 18	1.3
K5	3	3.5	3.5		3.9	2.6	0.62	0.000 026	1.4
Mo		3	3	5	3	2.0	0.59	0.000 0006	5.4
M5	2.5	2.95		4					
N		2.3							

* Temperatures of dwarfs are 10% to 20% higher than giants of same class (indirect methods)

† Abbot (1). By radiometer

‡ Potsdam observations Wilsing *et al* (10)

§ Coblentz (3) By thermocouple

‖ Saha (8) Calculated from initial appearance of certain spectral lines under pressure of 0.1 atmosphere (See note ¶)

¶ Fowler and Milne (4) Calculated from maximum intensity of certain spectral lines under pressure of 1.31 × 10⁻⁴ atmospheres, assuming 10 000° corresponds to maximum of Balmer lines of H These temperatures, and those of Saha, are for the reversing layer, true effective temperature is somewhat higher

STELLAR DIAMETERS

Unit: Linear Diameter, 10^6 km.

Star	Class	Parallax	Diameter	
			Angular*	Linear
α Tauri	K5	0.055″	0.022″	60
α Orionis	M2	0.019	0.044	347
α Bootis	Ko	0.088	0.022	37
α Scorpii	M1	0.017	0.040	353

* Measured by means of interferometer (5)

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(For a key to the periodicals see end of volume)

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(11) Wright, *Publ Lick Obs*, **13**: 262; 18.

DISTRIBUTION OF STARS

FREDERICK H. SEARES

Restriction.—No account is here taken of globular star clusters nor of stars included in spiral nebulae, many of which contain objects whose essentially stellar character can no longer be doubted.

Apparent Distribution and Number.—Statistically considered, the stars are distributed over the face of the sky with a high degree of regularity, their numbers gradually increasing as the Milky Way is approached from either side. The Milky Way defines what is very nearly a plane of symmetry, and for a first approximation, systematic difference between the two hemispheres, progressive changes in galactic longitude, and all local irregularities can be ignored. The resulting mean distribution, as found by Seares and van Rhijn, is shown in Table 1.

To apparent magnitude (see p. 39) $m = 13.5$ the results depend on data covering a large portion of the sky. From $m = 13.5$ to 18.5 they are derived from counts of stars on photographs of the 139 Selected Areas of Kapteyn between the North Pole and declination −15°. For still higher values of m, the values of log N_m are extrapolated, but the uncertainty consequent to the extrapolation itself is probably small. Excepting in low galactic latitudes, there is little or no systematic uncertainty arising from the particular choice of fields used for the counts. To $m = 16$ the magnitude scale is the mean of several closely accordant determinations made at different observatories, and is probably accurate within a few hundredths of a magnitude. Below this limit the scale depends wholly upon observations made at the Mount Wilson Observatory. Although this part of the scale has not been confirmed by independent measures made elsewhere, it has been established by methods successfully used for the brighter stars.

The indicated total, to the twenty-first photographic magnitude, of all stars in the sky is 890 000 000, and to the twentieth visual magnitude, 1 000 000 000. Barring losses of light by absorption, scattering etc., the increase in log N_m for a uniform distribution of stars throughout space would be 0.6 per unit of magnitude. The observed increase nowhere attains this value; the stars thin out with increasing distance from the sun, and at great distances they thin out more rapidly than near the sun; these changes are most pronounced in the direction of the poles of the Milky Way. If the law of decreasing space density indicated by the stars accessible to observation holds for those beyond present telescopic reach, the total number of luminous stars in the galactic system must be of the order of 3×10^{10}.

TABLE 1.—LOGARITHMS OF NUMBERS (N_m) OF STARS, OF MAGNITUDES LESS THAN m, PER SQUARE DEGREE IN DIFFERENT GALACTIC LATITUDES (1)

Units: Last column; m = visual magnitude; average $N_m = 1$, if $m = 8$. Other columns; m = international photographic magnitude (2); $N_m = 1$, if $m = 8$, Lat. = 0. Galactic pole: R. A. 12ʰ41ᵐ20ˢ, Dec. +27° 21′ (1875) (Gould).

m	Log₁₀ N_m at latitude														Log₁₀ (average N_m) between latitudes				
	0°	5°	10°	15°	20°	25°	30°	35°	40°	50°	60°	70°	80°	90°	0°–20°	20°–40°	40°–90°	0°–90°	0°–90° (v)
4.0	$\bar{2}$.19	$\bar{2}$.17	$\bar{2}$.12	$\bar{2}$.05	$\bar{3}$.99	$\bar{3}$.93	$\bar{3}$.87	$\bar{3}$.82	$\bar{3}$.78	$\bar{3}$.74	$\bar{3}$.71	$\bar{3}$.69	$\bar{3}$.67	$\bar{3}$.66	$\bar{2}$.12	$\bar{3}$.88	$\bar{3}$.73	$\bar{3}$.94	$\bar{2}$.11
4.5	$\bar{2}$.42	$\bar{2}$.40	$\bar{2}$.35	$\bar{2}$.28	$\bar{2}$.22	$\bar{2}$.16	$\bar{2}$.10	$\bar{2}$.05	$\bar{2}$.01	$\bar{3}$.97	$\bar{3}$.94	$\bar{3}$.92	$\bar{3}$.90	$\bar{3}$.88	$\bar{2}$.35	$\bar{2}$.11	$\bar{3}$.96	$\bar{2}$.17	$\bar{2}$.35
5.0	$\bar{2}$.65	$\bar{2}$.63	$\bar{2}$.58	$\bar{2}$.51	$\bar{2}$.45	$\bar{2}$.39	$\bar{2}$.33	$\bar{2}$.28	$\bar{2}$.24	$\bar{2}$.20	$\bar{2}$.17	$\bar{2}$.15	$\bar{2}$.13	$\bar{2}$.12	$\bar{2}$.58	$\bar{2}$.34	$\bar{2}$.19	$\bar{2}$.40	$\bar{2}$.60
5.5	$\bar{2}$.88	$\bar{2}$.86	$\bar{2}$.80	$\bar{2}$.74	$\bar{2}$.68	$\bar{2}$.62	$\bar{2}$.56	$\bar{2}$.51	$\bar{2}$.47	$\bar{2}$.43	$\bar{2}$.40	$\bar{2}$.38	$\bar{2}$.36	$\bar{2}$.34	$\bar{2}$.80	$\bar{2}$.57	$\bar{2}$.41	$\bar{2}$.63	$\bar{2}$.83
6.0	$\bar{1}$.11	$\bar{1}$.08	$\bar{1}$.03	$\bar{2}$.97	$\bar{2}$.90	$\bar{2}$.84	$\bar{2}$.79	$\bar{2}$.74	$\bar{2}$.70	$\bar{2}$.65	$\bar{2}$.62	$\bar{2}$.60	$\bar{2}$.58	$\bar{2}$.57	$\bar{1}$.03	$\bar{2}$.80	$\bar{2}$.64	$\bar{2}$.85	$\bar{1}$.07
6.5	$\bar{1}$.33	$\bar{1}$.31	$\bar{1}$.26	$\bar{1}$.19	$\bar{1}$.13	$\bar{1}$.07	$\bar{1}$.01	$\bar{2}$.97	$\bar{2}$.92	$\bar{2}$.88	$\bar{2}$.85	$\bar{2}$.83	$\bar{2}$.80	$\bar{2}$.79	$\bar{1}$.26	$\bar{1}$.03	$\bar{2}$.86	$\bar{1}$.08	$\bar{1}$.31
7.0	$\bar{1}$.56	$\bar{1}$.53	$\bar{1}$.48	$\bar{1}$.42	$\bar{1}$.35	$\bar{1}$.29	$\bar{1}$.24	$\bar{1}$.19	$\bar{1}$.15	$\bar{1}$.10	$\bar{1}$.07	$\bar{1}$.05	$\bar{1}$.02	$\bar{1}$.01	$\bar{1}$.48	$\bar{1}$.25	$\bar{1}$.09	$\bar{1}$.30	$\bar{1}$.54
7.5	$\bar{1}$.78	$\bar{1}$.76	$\bar{1}$.70	$\bar{1}$.64	$\bar{1}$.57	$\bar{1}$.52	$\bar{1}$.46	$\bar{1}$.41	$\bar{1}$.37	$\bar{1}$.32	$\bar{1}$.29	$\bar{1}$.27	$\bar{1}$.24	$\bar{1}$.23	$\bar{1}$.70	$\bar{1}$.47	$\bar{1}$.31	$\bar{1}$.52	$\bar{1}$.77
8.0	0.00	$\bar{1}$.98	$\bar{1}$.92	$\bar{1}$.86	$\bar{1}$.79	$\bar{1}$.74	$\bar{1}$.68	$\bar{1}$.64	$\bar{1}$.59	$\bar{1}$.54	$\bar{1}$.51	$\bar{1}$.48	$\bar{1}$.46	$\bar{1}$.44	$\bar{1}$.92	$\bar{1}$.69	$\bar{1}$.53	$\bar{1}$.74	0.00
8.5	0.23	0.20	0.14	0.08	0.01	$\bar{1}$.95	$\bar{1}$.90	$\bar{1}$.85	$\bar{1}$.81	$\bar{1}$.76	$\bar{1}$.73	$\bar{1}$.69	$\bar{1}$.67	$\bar{1}$.65	0.14	$\bar{1}$.91	$\bar{1}$.74	$\bar{1}$.96	0.23
9.0	0.45	0.42	0.36	0.29	0.22	0.17	0.12	0.07	0.03	$\bar{1}$.98	$\bar{1}$.94	$\bar{1}$.90	$\bar{1}$.88	$\bar{1}$.86	0.36	0.13	$\bar{1}$.96	0.18	0.45
9.5	0.67	0.64	0.57	0.50	0.44	0.38	0.33	0.28	0.24	0.19	0.15	0.11	0.08	0.06	0.58	0.34	0.16	0.39	0.68
10.0	0.89	0.85	0.79	0.72	0.65	0.59	0.54	0.50	0.45	0.40	0.35	0.30	0.28	0.26	0.79	0.55	0.37	0.60	0.90
10.5	1.10	1.07	1.00	0.93	0.86	0.80	0.75	0.70	0.66	0.60	0.55	0.50	0.47	0.45	1.00	0.76	0.57	0.81	1.11
11.0	1.32	1.28	1.21	1.14	1.06	1.01	0.96	0.91	0.86	0.80	0.74	0.69	0.65	0.64	1.22	0.96	0.76	1.02	1.32
11.5	1.53	1.49	1.42	1.34	1.27	1.21	1.16	1.11	1.06	0.99	0.92	0.87	0.84	0.82	1.43	1.17	0.95	1.22	1.53
12.0	1.74	1.70	1.63	1.54	1.47	1.41	1.36	1.30	1.25	1.18	1.11	1.05	1.01	1.00	1.63	1.36	1.14	1.42	1.74
12.5	1.96	1.91	1.83	1.75	1.67	1.61	1.55	1.49	1.44	1.36	1.28	1.23	1.18	1.17	1.84	1.56	1.32	1.62	1.94
13.0	2.16	2.12	2.04	1.95	1.87	1.80	1.74	1.68	1.62	1.54	1.46	1.39	1.35	1.33	2.04	1.75	1.50	1.82	2.14
13.5	2.37	2.32	2.24	2.14	2.06	1.99	1.92	1.86	1.80	1.71	1.62	1.56	1.51	1.49	2.24	1.93	1.67	2.01	2.34
14.0	2.57	2.52	2.43	2.34	2.24	2.17	2.10	2.03	1.97	1.88	1.78	1.72	1.67	1.65	2.44	2.11	1.83	2.20	2.52
14.5	2.77	2.72	2.63	2.52	2.43	2.34	2.27	2.20	2.14	2.04	1.94	1.87	1.82	1.80	2.63	2.29	1.99	2.38	2.71
15.0	2.96	2.91	2.82	2.71	2.60	2.51	2.44	2.36	2.30	2.19	2.09	2.01	1.96	1.94	2.82	2.45	2.14	2.56	2.89
15.5	3.15	3.10	3.01	2.89	2.77	2.68	2.60	2.52	2.45	2.34	2.24	2.15	2.10	2.08	3.01	2.62	2.29	2.73	3.07
16.0	3.33	3.28	3.19	3.07	2.94	2.84	2.75	2.67	2.60	2.48	2.37	2.29	2.23	2.21	3.19	2.77	2.43	2.90	3.24
16.5	3.51	3.46	3.37	3.24	3.10	2.99	2.90	2.81	2.74	2.61	2.50	2.42	2.36	2.34	3.37	2.92	2.56	3.07	3.40
17.0	3.68	3.64	3.54	3.41	3.26	3.14	3.04	2.95	2.87	2.74	2.63	2.54	2.48	2.46	3.54	3.07	2.69	3.23	3.56
17.5	3.85	3.81	3.71	3.57	3.41	3.28	3.17	3.08	3.00	2.86	2.75	2.66	2.60	2.57	3.70	3.20	2.81	3.39	3.71
18.0	4.01	3.97	3.87	3.73	3.56	3.42	3.30	3.20	3.12	2.98	2.86	2.77	2.71	2.68	3.86	3.34	2.93	3.54	3.86
18.5	4.16	4.12	4.03	3.88	3.70	3.55	3.42	3.32	3.23	3.08	2.97	2.88	2.82	2.79	4.02	3.46	3.04	3.68	4.00
19.0	4.32	4.28	4.18	4.02	3.84	3.67	3.54	3.43	3.34	3.19	3.08	2.98	2.92	2.89	4.17	3.59	3.14	3.82	4.13
19.5	4.46	4.42	4.32	4.16	3.97	3.79	3.65	3.53	3.44	3.29	3.17	3.07	3.01	2.98	4.31	3.70	3.24	3.96	4.26
20.0	4.60	4.56	4.46	4.29	4.09	3.90	3.75	3.63	3.53	3.38	3.26	3.16	3.10	3.07	4.45	3.81	3.33	4.09	4.38
20.5	4.74	4.69	4.59	4.42	4.21	4.01	3.85	3.72	3.62	3.46	3.34	3.25	3.18	3.15	4.58	3.91	3.42	4.21	
21.0	4.87	4.82	4.72	4.54	4.33	4.11	3.94	3.81	3.70	3.54	3.42	3.33	3.26	3.22	4.71	4.01	3.50	4.33	

Distribution of Intrinsic Brightness.—The range in intrinsic brightness among stars is enormous—at least twenty magnitudes, corresponding to an intensity ratio of 100 000 000 to 1. A knowledge of the frequencies of different luminosities among the stars in a given volume of space is essential (unless questionable assumptions are to be introduced) for the calculation of the space distribution of the stars. It is, however, difficult to obtain, and, at present, the frequencies are but imperfectly known. By assuming that the mean parallaxes of stars of apparent magnitude m and proper motion μ can be represented by a linear function of m and log μ supposed to be valid for all magnitudes and proper motions, Kapteyn and van Rhijn derived for the distribution of the absolute magnitudes a Gaussian error curve whose ordinates are given in the second column of Table 2. Seares (4) has shown that their adopted mean parallax formula does not represent the distances of the stars of large motion and faint apparent magnitude, all of which are of low luminosity. A revision of the parallax formula, still only provisionally determined, and a recalculation of the luminosity function from about 500 stars of large proper motion leads to the frequencies in the third column of Table 2.

TABLE 2.—APPROXIMATE LUMINOSITY FUNCTION

$\phi(M)$ = number of stars, absolute magnitude M, per cubic parsec in the neighborhood of the sun. Unit of distance for M is 10 parsecs. 1 parsec = 3.26 light years = 30.8×10^{12}km.

M	$10 + \mathrm{Log}_{10}\,\phi(M)$		Diff.
	Kapteyn v. Rhijn (³)	Seares (⁴)	
−4.64	2.61		
−3.64	3.42		
−2.64	4.17		
−1.64	4.85		
−0.64	5.46	5.58	0.12
+0.36	6.00	6.16	0.16
1.36	6.47	6.66	0.19
2.36	6.88	7.05	0.17
3.36	7.21	7.34	0.13
4.36	7.47	7.58	0.11
5.36	7.67	7.74	0.07
6.36	7.80	7.84	0.04
7.36	7.85	7.87	0.02
8.36	7.84	7.86	0.02
9.36	7.76	7.88	0.12
10.36	7.61	7.92	0.31
11.36	7.39	8.06	0.67
12.36	7.10	8.11	1.01
13.36	6.75	8.11	1.36
14.36	6.3	8.13	1.8

For the stars of low luminosity, the departure of Seares' curve from the error curve, shown by the differences in the fourth column, is important and must be accepted as real, although quantitatively the results are still very uncertain. The possibility of a maximum within the range of absolute magnitude considered is not excluded, but any such maximum must be well below the Kapteyn–van Rhijn limit, $M = 7.7$. Since the frequencies of stars of very low luminosity are still unknown, it is impossible at present to express the luminosity function as a true frequency function.

Space Distribution of Stars.—The space distribution is defined by a density function, preferably in a form expressing the total number of stars per unit volume at different distances from the sun. At present, however, we must be content with so expressing the number of stars which are brighter than some limit of absolute magnitude.

Analytically, the problem is to determine the density function, $\Delta(\rho)$, from the integral equation

$$\frac{dN_m}{dm} = \omega \int_0^\infty \phi(M)\Delta(\rho)\rho^2 d\rho$$

where the left hand member can be found from the data in Table 1; ω is a constant, ρ = distance from sun. Since $\phi(M)$, for $M > 8$, is still very uncertain, the general solution cannot be found at present. Values of the density for the neighborhood of the sun (Table 3) can, however, be calculated incidentally in deriving the data in Table 2. Results in the second column of Table 3 (M = 7.86) are in good agreement with similar results by Kapteyn and van Rhijn; the other tabular values indicate what is to be expected for lower limiting values of M. The uncertainty of the luminosity function for $M > 8$ scarcely justifies the effort required to complete the table.

TABLE 3.—AVERAGE NUMBER OF STARS, BRIGHTER THAN ABSOLUTE MAGNITUDE M, PER CUBIC PARSEC AT DISTANCE ρ FROM SUN (⁴)

Unit of ρ is 1 parsec; of distance for M, 10 parsecs. 1 parsec = 3.26 light years = 30.8×10^{12} km.

$\mathrm{Log}_{10}\rho$ \ M	7.86	8.86	9.86	10.86	11.86	12.86	13.86	14.86
0.9	0.028	0.035	0.042	0.050	0.060	0.073	0.087	0.098
1.1	.026	.033	.040	.048	.058	.069	.078	
1.3	.024	.030	.035	.041				
1.5	.023	.028	.033					
1.7	.022							
1.9	.020							
2.1	.017							
2.3	.014							
2.5	.011							
2.7	.008							
2.9	.004							

(Values based upon $\phi(M)$ for stars near the sun, and on the assumption that the relative frequencies of M are the same at all distances.)

Average densities for the whole sky give a very imperfect picture of the real distribution in space, as the latter varies greatly with galactic latitude. Broadly speaking, the surfaces of equal space density are concentric, and approximately similar, ellipsoids of revolution, similarly situated, with axes in the ratio of about 5 to 1. See Table 4.

TABLE 4.—RADII OF EQUIDENSITY ELLIPSOIDS(⁶)

$\Delta(\rho)$ = number of stars per cubic parsec at distance ρ from sun. (Values require revision for recent star counts (Table 1) and for error in luminosity function (*cf.* Table 2)).

Unit of radius = 1 parsec. 1 parsec = 3.26 light years = 30.8×10^{12} km. Latitude is galactic.

$\Delta(\rho)$	Latitude	
	90°	0°
1.00	0	0
0.63	118	602
0.40	198	1010
0.25	296	1510
0.16	413	2106
0.100	553	2820
0.063	717	3656
0.040	902	4600

Size of the Galactic System.—At present we have no certain indication as to the distance of the most remote stars belonging to the galactic system; but if ordinary blue stars of absolute magnitude zero occur among the faintest objects listed in Table 1, the diameter of the system cannot be less than a million light years. Such objects are not to be expected in high galactic latitudes, where the stars of very faint apparent magnitude are almost certainly all dwarfs; but their occurrence in the Milky Way is by no means excluded. We have, indeed, strong, though not conclusive, evidence of the existence in the Milky Way of stars of zero absolute magnitude among those of the sixteenth apparent magnitude. The corresponding diameter of the system is a hundred thousand light years. This value may be accepted with some assurance as a lower limit for the size of the system in the plane of the Milky Way, exclusive of such objects as globular star clusters and spiral nebulae, whose relation to the general stellar system about us is not yet clearly defined.

Position of the Sun.—The symmetrical distribution of stars adopted in Table 1 tacitly assumes the sun to be at the center of the system. This is not actually the case, as is shown by systematic deviations from the adopted mean distribution. Shapley's (⁸)

value for the distance of the sun from the galactic plane is about 60 parsecs, to the north, which is certainly of the right order of magnitude. The sun's distance from the center is much less certain, and different estimates range from a few hundred to many thousand parsecs, according to the underlying assumptions and the method of attack. The question is much complicated by the fact that the sun lies within a local cluster whose members form a considerable fraction of the stars of the brighter apparent magnitudes, and a final answer must await the detailed discussion of the distribution of faint stars in galactic longitude.

LITERATURE

(For a key to the periodicals see end of volume)

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DISTRIBUTION OF NEBULAE

FREDERICK H. SEARES

The term nebula is applied to objects of such diversity of form, size, distance, and physical characteristics that any study of their distribution presupposes a consideration of the question of classification. The following general classification by Hubble provides for two mutually exclusive divisions, characterized by position in the sky as well as by physical peculiarities, and five sub-classes representing physical differences.

A GENERAL CLASSIFICATION OF NEBULAE

I. Galactic nebulae, characterized by (1) tendency to concentrate about the Milky Way, (2) conspicuous association with individual stars from which they probably derive their luminosity, (3) early-type spectra, either emission or absorption, depending upon the spectral type of the associated stars, and (4) smooth and cloudy or wispy texture. They include

- (a) *Planetaries*, distinguished by symmetrical distribution of nebulosity about central stars, sharply defined edges, and emission spectra.
- (b) *Diffuse nebulae*, clouds in low galactic latitudes, usually associated with early-type stars. This type ranges from luminous to dark and from semi-transparent to opaque. Subdivided into predominantly luminous, predominantly obscure, and conspicuously mixed

II. Non-galactic nebulae, characterized by (1) tendency to avoid the Milky Way, (2) no conspicuous association with stars, (3) late-type absorption spectra, and (4) usually a rotational symmetry about dominating non-stellar nuclei. They include

- (a) *Elliptical nebulae*, amorphous objects whose forms can be represented as successive stages of an original globular mass flattening under the influence of increasing rotation
- (b) *Spirals of two kinds, logarithmic and barred*, which, once formed, appear to develop along parallel lines, the arms unwinding and the granulation of the material becoming more and more conspicuous.
- (c) *Irregular nebulae*, including a few non-galactic objects having no dominating nuclei and, significantly, showing no rotational symmetry.

Physically, the planetaries and diffuse nebulae, Ia and Ib, are distinct and apparently without genetic relationship, except that the planetaries, which, in some cases at least, seem to be late stages in the development of novae, may represent the catastrophic consequences of the penetration of a star within a nebulous cloud of the diffuse sub-class. The spirals IIb, on the other hand, are apparently an evolutionary development from elliptical nebulae, IIa, although it does not follow that all elliptical nebulae will necessarily become spirals. The few irregular nebulae, IIc, present features that might be expected in the case of spirals in the absence of or through the neutralization of dominating dynamical characteristics.

The distribution of the various classes of nebulae is not in general easily shown in tabular form. The following summary for each of the important sub-classes includes, however, references to diagrams which exhibit the main features of the distribution.

Ia. Planetary Nebulae.—In the whole sky only about 150 of these objects are known, many of which are so small as to be recognizable only from their gaseous emission spectra. The smallest objects are closely associated with the Milky Way, and show a marked concentration in the Aquila-Sagittarius region. With increasing size the mean galactic latitude increases, and the largest known objects, to the extent of a dozen or so, are scattered over the sky with some approach to uniformity (3, 6, 11). This suggests that the linear distances of planetaries from the galactic plane are relatively small and that their angular diameters are correlated with their distances from the sun. Very small nebulae thus appear in low galactic latitudes because their distances from the sun are many times their distances from the galactic plane.

The actual distances of planetary nebulae are still very uncertain. Van Maanen (15) has measured the parallaxes of about 20 of these objects and finds distances ranging from 50 to a few hundred parsecs; but, as he points out, these values are in conflict with the fact that the radial velocities average about 30 km/sec, while the proper motions are apparently small, of the order of the parallaxes themselves.

Ib. Diffuse Nebulae.—The distant star clouds of the Milky Way define the galactic circle. A secondary galaxy, inclined some 12° to the galactic circle proper, is outlined by the bright helium stars of the much-flattened local cluster immediately surrounding the sun, most of whose members are within 500 parsecs (14). The diffuse nebulae outside the Magellanic Clouds, some hundreds in all,[1] are closely associated with the primary and secondary galactic circles (7). Since the mean galactic latitude of those following the primary galaxy is only about 2°, and since the space within the two circles is not well filled, the inference is that these nebulae are directly connected either with the Milky Way star clouds or with the local cluster, and that few are to be found in the intervening regions. We thus have a group of diffuse nebulae whose members are within a few hundred parsecs of the sun; the others, forming a widely scattered group associated with the Milky Way, are at distances probably to be counted in thousands of parsecs (10). Both groups include both luminous and dark nebulae; the luminous members of the two groups present somewhat different physical characteristics, most marked in their spectra, which may be either emission, or predominantly continuous or absorption in type. The continuous and absorption spectra occur mostly among the nearer objects connected with the local cluster. The luminous diffuse nebulae are conspicuously associated with stars of high temperature from which they derive their luminosity, either by excitation or reflection.

II. Non-galactic Nebulae.—The members of this class, consisting chiefly of the related sub-classes, elliptical nebulae (IIa) and spirals (IIb), are far more numerous than the galactic nebulae. On the whole, the elliptical nebulae out number the spirals many times; but if only bright objects are considered, the spirals are the more numerous. The distribution in galactic latitude is shown in

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[1] Less than 200 luminous ones known; no complete list published (r. 7, 8). Most complete list of dark nebulae (182 small objects) is given by Barnard (9).

Table 1, which gives to limiting magnitude 18.6 on the international photographic scale the average number per square degree at various latitudes in each hemisphere. The data are compiled from Fath's list (4), based on Mount Wilson photographs (exposure time 1 hour with 60-inch reflector) of the 139 Selected Areas between the North Pole and declination −15°. That part of the northern galactic hemisphere within which nebulae are frequent is wholly covered. About one-half the southern hemisphere is included, but not the south pole itself. Fath's counts have been corrected for losses caused by poor definition in the corners of the negatives (13).

TABLE 1.—NON-GALACTIC NEBULAE: NUMBER PER SQUARE DEGREE(4)

Average number; international photographic magnitude ≦ 18.6; *cf.* Table 2.

Galactic latitude	Hemisphere	
	N	S
5°	0.2	0.0
15	0.8	0.4
25	2.5	5.4
35	13.2	8.2
45	10.3	5.8
55	12.2	7.0
65	22.2	11.9
74	31	
83	(68)	

Fath's list includes all classes of nebulae, but the galactic nebulae are relatively so infrequent that it is practically one of non-galactic nebulae alone. These objects begin to appear at about 20° latitude and increase rapidly in the interval 20° to 35°. From 40° to 70° the numbers increase slowly. The concentration near the north galactic pole is very pronounced. Below latitude 70° the numbers in the southern hemisphere average about three-fourths those of the northern. The assumption of a similar ratio for the regions 70° to 90° leads to integrated totals of 170 000 and 128 000 for the northern and southern hemispheres, a round total of 300 000 for the whole sky (limiting phot. mag. for stars 18.6).

The summary in Table 2 emphasizes the dependence of the distribution on galactic latitude. The uncertainty in the average number per square degree in the region 70°–90° is considerable, and since the number of nebulae in this region is large (29% or 50 000 in the northern hemisphere), the total given for the whole sky is in doubt by many thousand. Curtis (2) has estimated the total (to an undetermined limiting magnitude) to be over 700 000. The difference in the estimates may arise from a difference in magnitude limits or from the fact that the fields counted by Curtis are not certainly representative of the sky as a whole.

TABLE 2.—DISTRIBUTION OF NON-GALACTIC NEBULAE

Lat. = interval in galactic latitude. Sky = % area of sky. Neb. = % number of nebulae. N = northern, S = southern hemisphere.

Lat.	Sky	Neb.	
		N	S
0°–30°	50	7	15
30–70	44	64	56
70–90	6	29	29

The distribution of non-galactic nebulae is not, however, simply one of galactic latitude. Data collected by Hardcastle and Hinks (5) and by Reynolds (12) show marked irregularities in longitude, which seem to depend on the angular diameters of the nebulae. Thus objects with diameters > 10′ are almost all in the hemisphere including galactic longitudes 50° to 230°. For diameters 5′ to 10′ the northern galactic hemisphere shows high frequencies in longitude 110° and 260°–270°, which become even more marked for diameters 2′ to 5′. For still smaller nebulae, the distribution is again different. Fath's counts, including mostly very small and faint nebulae, show a band of high frequency crossing the northern galactic hemisphere approximately in longitudes 50° and 220°, with other irregularities suggesting a very complicated distribution.

Nothing is known directly of the distances of elliptical nebulae, but their relationship with the spirals is so intimate that the distances of the two sub-classes must be regarded as of the same order. Van Maanen's measures (16) of internal motion in spirals suggest distances of the order of 3000 to 30 000 light years. The application of Shapley's period-luminosity relation by Hubble (9) to numerous typical Cepheid variables discovered by him in the spirals Messier 31 (the Andromeda nebula) and Messier 33 leads to distances of about a million light years for these two objects. The applicability of the period-luminosity relation is assumed, but several lines of corroborative evidence strongly support the larger value of the distance. It is probable, however, that the zero point of the period-luminosity relation requires revision by an amount which would reduce these distances by about 40%.

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(For a key to the periodicals see end of volume)

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MOTIONS OF THE STARS AND NEBULAE

GUSTAF STRÖMBERG

The *proper motion* of a star is defined as the angular motion, per year, referred to a certain fundamental system of apparently bright stars distributed uniformly over the sky. The *radial motion* is determined by the Doppler shift for spectral lines of known wave-length. If the distance to a star is known, the three velocity-components of its *space-velocity* can be determined. Proper motions and radial velocities are in general referred to the sun as origin, by correction for the periodic changes due to the earth's motion. The proper motions are in general very small; for the majority of the stars they are below 0.1″ per year. The largest proper motion is that of Barnard's star R. A. 17^{h} 53.0^{m}, Dec. + 4° 28′, (1900.0), which moves 10.27″ per year. The radial velocities are mostly below 40 km/sec, the largest being that of the variable star V X Herculis, which approaches the sun with a velocity of 390 km/sec. The spiral nebulae have even higher velocities, the highest being 1800 km/sec, recession, (N. G. C. 584).

SOLAR MOTION

The sun's motion relative to the stars can be determined either from proper motions, from radial velocities, or from space-velocities. The point in the sky towards which the sun is moving is called the sun's *apex*.

Table 1.—Solar Apex and the Sun's Velocity
(Referred to apparently bright stars. Unit· velocity, km/sec)

R. A. 1900		Dec. 1900	Velocity	Method	No. of stars	Lit.
18^h	03^m	+34.3°		Proper Motions P. G. C.*	5413	(2)
18	11	+31.6		Proper Motions m<6.0†	4041	(5)
17	56	+32.3		Proper Motions P. G. C.	5943	(8)
17	54	+25.3	19.5	Rad. Vel. Lick Obs.	1193	(3)
18	2	+28 6	19.8	Rad. Vel. B to M	1596	(6)
18	4	+29.2	21.5	Rad. Vel. F to M	1405	(9)
18	11	+36.9	18.8	Space Vel. Giants	800	(10)
18	43	+29.5	31 7	Space Vel. Dwarfs	415	(10)
18	40	+32	29	Space Vel. of nearby stars	83	(7)

* Preliminary General Catalogue by L. Boss, Washington, 1910

† Stars brighter than the 6th magnitude (apparent).

Although the agreement between the different determinations is fairly good, a detailed study shows that the sun's motion can not be regarded as a constant vector. The A stars and giant stars in general give a small velocity for the sun; and dwarf stars, a much higher velocity.

AVERAGE PECULIAR MOTIONS OF THE STARS

After the effect of the sun's motion has been removed, the residual or "peculiar" velocities show certain regularities. The average peculiar velocities are different for stars of different spectral types, and vary also with the intrinsic brightness of the stars.

Table 2.—Average Residual Radial Velocities (θ) of Stars of Different Spectral Classes (Sp) and Absolute Magnitudes (M)

Unit of θ = 1 km/sec

Sp	M*	θ	Lit.	Sp	M*	θ	Lit.
O5 to O9	−3	20 7	(11)	K	+1	18 4	(1)
B	−1	6 5	(3)	K	+6	27 0	(1)
A	+1	11 0	(11)	M	+1	21.6	(1)
F	+2	15.8	(1)	M	+9	29.6	(11)
G	+1	18 0	(1)	Me†	0	40 1	(11)
G	+5	26 3	(1)	P‡	–	28 6	(11)

* The apparent magnitude as observed from a distance of 10 parsecs

† Contains M stars with bright hydrogen-lines, all are variable stars of long period.

‡ Bright-line nebulae.

PREFERENTIAL MOTION

The peculiar velocities of the stars are not distributed at random. In general the stars show a tendency to move parallel to the galactic plane. To describe the distribution of the peculiar velocities, a distribution-function is adopted, which gives the relative numbers of stars moving in different directions and with different velocities. The simplest distribution-function is the spherical distribution-law,

$$F(xyz) = \frac{N}{(2\pi)^{\frac{3}{2}}\sigma^3}\, e^{-\frac{x^2+y^2+z^2}{2\sigma^2}}$$

where x, y, and z are the velocity-components referred to the "centroid" of the group. N is the number of stars in the group, and σ is the dispersion or the square-root of the mean of the squares of the velocity-components. The number of stars of velocity-components between $x \pm \frac{1}{2}dx, y \pm \frac{1}{2}dy, z \pm \frac{1}{2}dz$ is then given by $F(xyz)\, dx dy dz$. In a spherical distribution, the frequency of a velocity is independent of its direction and only dependent upon its size. Spherical velocity-distributions occur for several classes of stars, but in general the distribution in velocity-space is either flattened (B stars) or elongated (A, F, and dwarf stars). Two functions have been used to describe the elongated distribution. Kapteyn and Eddington have used a sum of two spherical functions and have regarded the stars as belonging to two intermingled systems, "two stream hypothesis." Schwarzschild has introduced the ellipsoidal distribution defined by the distribution-function

$$F(xyz) = \frac{N}{(2\pi)^{\frac{3}{2}}abc}\, e^{-\left(\frac{x^2}{2a^2}+\frac{y^2}{2b^2}+\frac{z^2}{2c^2}\right)}$$

with three principal dispersions a, b, and c, which define the three axes of the "velocity-ellipsoid." The velocity-components x, y, and z are here projected on the principal axes of this ellipsoid. The major axis of the velocity-ellipsoid corresponds to the line joining the two centers in the two stream theory. The direction of this fundamental axis, which is common in the two theories, is about R. A. $6^h\ 6^m$, Dec. + 9°, (true vertex). The dwarf stars give a somewhat higher declination for the true vertex.

In the analysis of proper motions, the two stream theory gives two vertices, which correspond to the directions of motion of the two streams relative to the sun. The coordinates of these vertices are R. A. $6^h\ 14^m$, Dec. −13° (first stream) and R. A. $19^h\ 16^m$, Dec. −60° (second stream).

Analyzing stellar motions on the basis of the two stream theory, we find a number of stars which cannot be regarded as belonging to either of the two streams. The B stars and stars of spectral class M, for instance, have a group-motion intermediate between the two streams. For this reason Halm has introduced a third stream (0 stream). But these streams taken together can be fairly well represented by an ellipsoidal distribution using a smaller number of parameters.

Charlier (4) has introduced a generalization of the ellipsoidal theory which makes it possible to take into account deviations from a strictly ellipsoidal distribution, but it is only when these deviations are small that this generalization is practicable.

MOVING CLUSTERS OR GROUPS

Several stars move nearly parallel to one another, the best known example being 5 of the 7 bright stars in the constellation Ursa Major. Another moving group or cluster is the Hyades in the constellation Taurus (Taurus Group). The proper motions of the stars belonging to such a group converge towards a point in the sky, the "convergent point," whose position in the sky gives the direction of motion of the group relative to the sun. The convergent point for 17 stars belonging to the Ursa Major Group is R. A. $20^h\ 30^m$, Dec. −40°; for the Taurus Group (39 stars) R. A. $6^h\ 7^m$, Dec. + 7°. A number of other moving groups are known.

THE GENERAL DISTRIBUTION OF COSMIC VELOCITIES

When the sun's motion is referred to different clases of objects it has been found that this motion is not a constant vector but varies greatly, from about 12 km/sec for the A stars and the Cepheids of long period up to 300 km/sec for the fast moving objects, the globular clusters and the spiral nebulae. A general relationship between group-motion and dispersion exists, which, according to Strömberg (11), holds for all classes of objects, but with a small deviation for the B star system. This variation in group-motion produces an asymmetry in the velocity distribution, in such a way that all fast moving objects move, relative to the sun, towards the same hemisphere. This asymmetry defines an axis along which the group-motion increases with increasing internal velocity-dispersion. The direction of this axis is R. A. $8^h\ 39^m$, Dec. −57°, and the motion of objects with small velocity-dispersion relative to those of high velocity-dispersion is about 300 km/sec in the opposite direction. The group-motion of objects with high velocity-dispersion is approximately the same as that of the globular clusters and spiral nebulae.

The general distribution of cosmic velocities can be approximately represented by a product of two symmetrical distributions S_1 and S_2. The first of these is a sum of concentric and co-axial ellipsoidal distributions, the velocity of the sun relative to the center of the distribution S_1 being 14.8 km/sec in the direction R. A. $17^h\ 43^m$, Dec. +22°. The sun's motion relative to the second distribution, S_2, is 300 km/sec in the direction R. A. $20^h\ 28^m$, Dec. +56°. The first distribution can be regarded as the velocity-distribution in our local system of stars, the second as a velocity-restriction in a universal world-frame of enormous dimensions. Other interpretations, however, may be possible.

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(For a key to the periodicals see end of volume)

(1) Adams, Strömberg and Joy, *21*, **54**: 9; 21. (2) Boss, *396*, **26**: 111; 10. (3) Campbell, *Lick Obs Bull.* No. **196**; 11. (4) Charlier, *Lund Observatorium, Meddelanden*, **II**: No 13; 15. (5) Charlier and Wicksell, *Ibid.*, **II**: No 12: 45, 15 (6) Gyllenberg, *Ibid.*, **II**: No. 13; 15. (7) Luyten, *Annals Harvard College Obs* **85**: No 5; 23 (8) Raymond, *396*, **30**: 191; 17. (9) Strömberg, *21*, **47**: 7, 18.
(10) Stromberg, *21*, **56**: 265; 22 (11) Strömberg, *21*, **61**: 363; 25.

TIME

Chronological Eras

Gregorian Calendar

Era	Year	Begins, 1925 A. D.
Byzantine¶	7434	September 14
Diocletian¶	1642	September 11
Grecian*¶	2237	September 14 October 14
Hegira	1344‡	July 21
Japanese	2585†	January 1
Jewish	5686‡	September 18
Julian calendar	1925	January 14
Julian period	6638§	January 14
Mohammedan	1344‡	July 21
Nabonassar¶	2674	May 12
Rome¶	2678‖	January 14
Seleucidae¶	2237	(See Grecian)

* In present-day usage of Syrians, begins in September or October depending upon the sect. In ancient usage of Damascus and Arabia Petraea, began with vernal equinox.

† The 14th year of period Taisho.

‡ Begins at sunset.

§ Julian day number of January 1, 1925 (Gregorian) is 2 424 152

‖ Since foundation of Rome, according to Varro

¶ Based upon Julian calendar.

Time

Interval	Days*
Year:	
Tropical†	365 2422
Sidereal	365 2564
Anomalistic	365 2596
Month:	
Synodical†	29 530 59
Tropical	27 321 58
Sidereal	27 321 66
Day:	
Sidereal	0 997 2696

* Mean solar days. † Ordinary

Equation of Time*

(Δ = mean − apparent)

Unit of Δ is minute. Time is Greenwich mean noon

Date	Δ	Date	Δ	Date	Δ
I 1	+ 3.4	V 11	−3.8	IX 18	− 5.6
6	5.8	16	−3.8	23	− 7.3
11	7.8	21	−3.7	28	− 9.0
16	9.7	26	−3.3	X 3	−10.7
21	11.3	31	−2.6	8	−12.2
26	12.6	VI 5	−1.8	13	−13.5
31	13.6	10	−1.0	18	−14.6
II 5	14.1	15	0.0	23	−15.5
10	14.4	20	+1.1	28	−16.1
15	14.3	25	2.2	XI 2	−16.3
20	14.0	30	3.2	7	−16.3
25	13.3	VII 5	4.2	12	−15.9
III 2	12.4	10	5.0	17	−15.1
7	11.4	15	5.6	22	−14.0
12	10.0	20	6.1	27	−12.5
17	8.7	25	6.3	XII 2	−10.7
22	7.2	30	6.3	7	− 8.8
27	5.7	VIII 4	6.0	12	− 6.5
IV 1	4.2	9	5.4	17	− 4.1
6	2.7	14	4.7	22	− 1.6
11	1.2	19	3.7	27	+ 0.9
16	+ 0.0	24	2.5	31	+ 2.8
21	− 1.2	29	+1.1		
26	− 2.2	IX 3	−0.4		
V 1	− 2.9	8	−2.1		
6	− 3.4	13	−3.8		

* Δ is the amount by which mean time exceeds apparent time when it is noon at Greenwich, it is the excess of the right ascension of the actual sun over that of the mean sun at that instant. It varies continuously with the time, and does not exactly repeat its values in successive years; those given are average values for Greenwich mean noon of an ordinary year, and will seldom differ from the actual values for that time by as much as 0.2 min., except in January and December, when the difference may amount to 0.3 min. In leap years, all dates in the table after February must be reduced by one day.

SOLAR SYSTEM

ORBITAL DATA; SOLAR SYSTEM (1925)

Units: Distance, 10^6 km; period, tropical year

Planet	Distance*	Eccentricity	Inclination†	Mean longitude		Sidereal period
				Node‡	Perihelion	
☿ Mercury. .	57 9	0 2056	7° 0′ 12.0″	47° 26′ 32 1″	76° 17′ 18.9″	0.24085
♀ Venus .	108 1	0 0068	3 23 38 0	76 0 16 7	130 30 56.8	0.61521
⊕ Earth .	149 5	0 01674			101 39 2 3	1.00004
♂ Mars . .	227 8	0 0933	1 51 0 6	48 58 45.0	334 40 42.2	1 88089
♃ Jupiter	778	0 0484	1 18 26 4	99 41 26 3	13 6 51.4	11 862
♄ Saturn	1426	0 0558	2 29 28 7	113 0 5 7	91 34 42.0	29.458
♅ Uranus.	2869	0 0471	0 46 22 1	73 36 57 7	169 26 56.8	84.015
♆ Neptune	4196	0 00855	1 46 36 7	130 57 13 3	43 58 27.9	164 788

* Mean distance

† Angle between plane of orbit and plane of ecliptic

‡ Ascending node

CHARACTERISTICS OF MEMBERS OF SOLAR SYSTEM

Units: Linear diameter, 1000 km; density, g/cm³; time, mean solar

Name	Diameter		Mass† × 10^6 / Mass sun	Density	Sidereal rotation	Number satellites
	Linear	Angular*				
Mercury..	4 84	10 90″	0 1670	5 6		0
Venus.	12 19	1′ 0 80	2.451	5 1		0
Earth.. .	12 76§		3 036‡	5 52	23 hr 56.07 min	1
Mars........ .	6 78	17 88	0 3233	3 9	24 37 4	0
Jupiter	142 7§	46 86§	951 8	1 4	9 8 hr	7
Saturn	120 8§	19 52§	285 6	0 7	10 2 hr	9
Uranus..	49 7	3 76	43 7	1 3+		4
Neptune	53 0	2 52	50 8	1 3		1
Sun‖	1391	31 59 26	1 001 341	1 4	25 3 da	
Moon	3 48	31 5 16¶	0 037**	3.3	27.32 da	

* At distance = difference mean distance sun to object and mean distance sun to Earth, nearly at distance of nearest approach to Earth.

† Includes satellite (or planetary) system, if any

‡ Mass of Earth alone = 2 999 × 10^{-6} mass of sun

§ Equatorial diameter Polar diameter Earth = 12 71, Jupiter = 133 2, 43 74″, Saturn = 108 1, 17 46″ Diameter of sphere of volume = Earth, is 12 74

‖ At mean distance of Earth, gravitational acceleration due to Sun is k^2 = 2 9592 × 10^{-4} (mean distance) per day² = 0 5926 cm per sec². For solar spectrum etc , see index

¶ At mean distance from Earth Apparent diameter varies, with distance, from 29 5′ to 33 5′

** Moon alone. Mass Moon = 0 01227 mass Earth

SOLAR DATA

Inclination of equator to ecliptic, about	7°
Longitude of ascending node of equator	74 5°
Period of rotation, about	28 da*
Sun spot period, about	11 yr

TERRESTRIAL AND LUNAR DATA†

General precession (retrograde) ...	50 2564″ + 0 000222″(t - 1900) per yr
Obliquity of the ecliptic .	23° 27′ 8 26″ - 0 4684 ″(t - 1900)

* From observations of sun spots near latitude 15°, spots near equator rotate in about 24 da; those near lat 80°, in 30 da

† For geodetic and geophysical data, see p 393.

Constant of nutation.	9 21″	Paris conference values
Constant of aberration	20 47″	
Solar parallax	8 80″	
From parallax measurements		8.806″
From velocity of light		8 781
From mass of Earth.		8.762
From motion of Moon		... ... 8 773
Equatorial horizontal parallax of Moon*	57′ 2 70″ (Brown)	
Mean distance Earth to Moon...... ..	384 403 km	
Inclination of Moon's equator to ecliptic	1° 32 1″	
Inclination of Moon's orbit to ecliptic, about 5°		
Eccentricity of Moon's orbit (average)...	0 055	
Revolution of Moon's nodes (retrograde) .	18.6 yr	

* Mean of greatest and least values; actual values vary from 53′ to 61′ ca.

COMPOSITION OF THE ATMOSPHERE

W. J. HUMPHREYS

TABLE 1.—COMPOSITION OF DRY AIR AT SEA-LEVEL (4, 5)

v = volume of the gas in volume V of dry air

Gas . . .	N_2	O_2	A	CO_2	H_2*	Ne	He	Kr	Xe
$10^4v/V$. . .	7803	2099	94	3	1	0 123	0 04	0 005	0 0006

* Values found by analysis vary; the one here given is that accepted by Hann and the Recueil de Constantes Physiques.

TABLE 2.—COMPOSITION OF ATMOSPHERE AT VARIOUS LEVELS

Computed from data of Table 1 on the assumptions: (1) at surface, H_2O vapor supplies 1.2% of the total number of gas molecules, (2) absolute humidity decreases rapidly to a negligible amount at about 10 km, (3) temperature = 11°C at sea-level, decreases normally (6°C per km) to −55°C at 11 km, remains constant above 11 km, (4) relative proportions of the gases, water vapor excepted, remains constant up to 11 km, (5) above 11 km, distribution is in accordance with their molecular weights (3). The amount of H_2 is in doubt (see note Table 1), especially above 11 km; it may become oxidized to H_2O before reaching the upper atmosphere.

v = volume of the gas contained in volume V of atmosphere. Unit of height = 1 km = 0 621 mi.; of pressure = 1 mm of Hg

Height	$100v/V$							Total pressure
	N_2	O_2	H_2O	A	CO_2	H_2	He	
140	0 01					99 15	0 84	0 0040
130	0 04					99 00	0 96	0 0046
120	0 19					98 74	1 07	0 0052
110	0 67	0 02	0 02			98 10	1 19	0 0059
100	2 95	0 11	0 05			95 58	1 31	0 0067
90	9 78	0.49	0.10			88 28	1 35	0 0081
80	32 18	1 85	0 17			64 70	1.10	0.0123
70	61 83	4 72	0 20	0 03		32 61	0 61	0.0274
60	81 22	7 69	0 15	0 03		10 68	0 23	0 0935
50	86 78	10 17	0 10	0 12		2 76	0 07	0 403
40	86 42	12 61	0 06	0 22		0 67	0.02	1.84
30	84 26	15 18	0 03	0 35	0.01	0 16	0 01	8 63
20	81 24	18 10	0 02	0 59	0 01	0 04		40 99
15	79 52	19 66	0 01	0 77	0 02	0 02		89 66
11	78 02	20 99	0 01	0 94	0 03	0 01		168 00
5	77 89	20 95	0 18	0 94	0 03	0.01		405.
0	77 08	20 75	1 20	0 93	0 03	0 01		760.

TABLE 3 MASSES OF THE ATMOSPHERE AND ITS CONSTITUENTS

Based upon Table 1, the assumptions of Table 2, and the assumption that the average atmospheric pressure at the surface of the earth = 73 7 cm and at base of stratosphere = 14.5 cm (1, 2). Area of earth is taken as 51 × 10^{17} cm².

Total mass M = $m \times 10^n$ kg; 1000 kg = 1.102 tons (of 2000 lb.)

Gas	All	N_2	O_2	A	H_2O	CO_2	H_2	Ne	Kr	He	Xe
m	511	387	116	624	133	217	129	471	64	63	116
n	16	16	16	14	14	13	12	11	11	11	10

LITERATURE

(For a key to the periodicals see end of volume)

(1) Hann, *Lehrbuch der Meteorologie* (3rd ed) (2) Humphreys, *Monthly Weather Review*, **49**: 341, 21 (3) Humphreys, *Physics of the Air*, p. 60; 20. (4) Ramsay, *5*, **80**: 599; 08 (5) Various authorities

MISCELLANEOUS GEODETIC DATA

W. D. LAMBERT

With certain exceptions which are especially noted, those of the following data which depend upon the dimensions of the earth have been calculated strictly in accordance with the INTERNATIONAL ELLIPSOID OF REFERENCE, adopted by the Section of Geodesy of the International Geodetic and Geophysical Union, meeting at Madrid, October 6 and 7, 1924. This ellipsoid is based upon the results obtained by J. F. Hayford (Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy, Washington, 1910), but is not absolutely identical with Hayford's ellipsoid. (For some of the other spheroids that are used for geographical purposes, see Special Publication #100, U. S. Coast and Geodetic Survey. Recent attempts have been made to show that the actual figure of the earth can be represented more closely by an ellipsoid of three unequal axes, than by one of revolution, systematic departures from the latter being of the order of 100 to 200 meters in elevation and depression.)

If the positions of the two ends of a line are determined geodetically for any assumed spheroid of reference, the uncertainty in the length of the line as measured along the earth depends almost entirely upon the errors in the survey; for geodetic surveys of the highest class, the uncertainty is a little less than one in 100 000 and for an ordinary fair survey it is about four times as great. The proportional error in the straight-line distance is greater, mainly because the geoid does not coincide with the ellipsoid; these additional errors are not serious for a short line, but for two points almost diametrically opposite may amount to 100 or 200 meters.

If the end points are determined astronomically, the principal error in the computed length is due to the difference in the deflection of the plumb-line at the two points; unless the measured line is short, the *average* uncertainty so introduced is of the order of 200 meters, but may be much more, especially in rugged country.

Latitude.—The latitude of a place is defined as the angle which some line of reference makes with the equatorial plane. Four lines of reference, defining four distinct kinds of latitude, are used. Three of these lines pass through the place considered; *viz.*, (1) The plumb-line, defining the *astronomical* latitude, (2) the normal to the spheroid of reference, defining the *geographical* latitude, and (3) the line to the center of the earth, defining the *geocentric* latitude. The fourth line of reference passes through the center of the earth and that point which is upon the circumscribed sphere (radius = equatorial radius of the spheroid) and at the same distance from the axis of rotation as is the point on the spheroid representing the place considered; this defines the *parametric*, or *reduced*, latitude.

Gravity.[1]—If the earth's sea-level surface were accurately represented by the International Ellipsoid of Reference, and if no attracting matter projected above this surface, then the variation of gravity at sea-level (γ_0) would be represented by the equations

$$\begin{aligned}\gamma_0 &= \gamma_e(1 + 0.005\ 288 \sin^2\varphi - 0.000\ 006 \sin^2 2\varphi)\\ &= \gamma_{45}(1 - 0.002\ 637 \cos 2\varphi + 0.000\ 006 \cos^2 2\varphi)\end{aligned}$$

---

[1] The resultant acceleration arising from the gravitational attraction and the rotation of the earth.

where φ is the geographic latitude, and γ_o, γ_{45} are the values of γ_o at the equator and at latitude 45°, respectively. These equations differ slightly from that used in computing the table on p. 396; the latter corresponds to an ellipticity of 1/297.4.

TABLE 1.—FORM AND SIZE OF THE EARTH

Based upon International Ellipsoid of Reference; accepted constants, *from which the others are computed*, are a = 6 378 388 meters, ellipticity $[=(a-b)/a]$ = 1/297. The indicated uncertainties are estimates, by Lambert, based upon a consideration of systematic errors as well as of internal discordances.

a = semi-major axis ...... = 6 378 388(±60)m
b = semi-minor axis ...... = 6 356 911 946 m
Radius of sphere of same area ...... = 6 371 227 7 m
Radius of sphere of same volume ...... = 6 371 221 3 m
Length of equatorial quadrant ...... = 10 019 148 4 m
Length of meridonal quadrant ...... = 10 002 288 3 m
f = ellipticity = $\left(\frac{a-b}{a}\right)$ ...... = 0 003 367 0034
$\frac{1}{f}$ = reciprocal of ellipticity ...... = 297 0(±0 4)
e^2 = (eccentricity)^2 = $f^2\left(\frac{2}{f}-1\right) = \frac{a^2-b^2}{a^2}$ = 0 006 722 6700
Area of the ellipsoid ...... = 510 100 934 km²
Land area ...... = 148 847 000 km²
Ocean area ...... = 361 254 000 km²
Volume of the ellipsoid ...... = 1 083 319 78 × 10⁶ km³
Mass of the ellipsoid* (d = 5 527 g/cm³, p 395) = 5 988 × 10²⁴ kg
Principal moments of inertia ($A = B < C$)†
A‡ = B‡ ...... = 0 332 35 Ea^2
C‡ ...... = 0 333 44 Ea^2
$C - A$ ...... = 0 001 0921 Ea^2
$\left(\frac{C-A}{C}\right) = \left(\frac{1}{305\ 12}\right)$§ ...... = 0 003 2774

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* For discussion of variation of density with depth below surface, *see* Adams and Williamson, Smithsonian Annual Report, 1923, p 241

† E = mass of earth.

‡ Computed values vary but little with any admissible assumption regarding the constitution of the interior of the earth Values are based upon computations of De Sitter (*64V*, **27**: 233, 21); ellipticity taken as 1/296 92

§ *Deduced from* precession of equinoxes, involves no hypothesis regarding constitution of interior of earth.

TABLE 2.—DISTANCES UPON SURFACE OF THE INTERNATIONAL ELLIPSOID OF REFERENCE

M = length of meridian from equator to geographic latitude φ; S_m = length of meridian from latitude $(\varphi - \frac{1}{2}\Delta\varphi)$ to $(\varphi + \frac{1}{2}\Delta\varphi)$; S_p = length of arc of parallel for 1° of longitude at latitude φ. These may be computed by means of the equations: $M = a\varphi - b \sin 2\varphi + c \sin 4\varphi - d \sin 6\varphi$; $S_m = a\Delta\varphi - b \sin \Delta\varphi \cos 2\varphi + c \sin 2\Delta\varphi \cos 4\varphi - d \sin 3\Delta\varphi \cos 6\varphi$; S_m (for $\Delta\varphi$ = 1°) $= a - b \cos 2\varphi + c \cos 4\varphi - d \cos 6\varphi$; $S_p = a \cos \varphi - b \cos 3\varphi + c \cos 5\varphi$; where the coefficients and their logarithms have the following values:

Unit of length = 1 meter; of angle = 1°

	M*		S_m*		S_m* for $\Delta\varphi$ = 1°		S_p*	
	Value	log₁₀	Value	log₁₀	Value	log₁₀	Value	log₁₀
a	111 136.537	5.045 856 86	111 136 537	5 045 856 86	111 136.537	5.045 856 86	111 417.657	5.046 954 02
b	16 107 035	4 207 015 6	32 214 069	4 508 045 6	562.213	2.749 901	93.904	1.972 686
c	16.976	1.229 84	33 952	1 530 87	1.185	0 073 7	0.119	$\bar{1}$.074 6
d	0.022	$\bar{2}$ 348	0 045	$\bar{2}$.649	0 002	$\bar{3}$ 37		

* Owing to uncertainty regarding the actual size of the earth, actual distances upon the earth at sea-level may differ from these computed distances by about 2 in 100 000 near the equator or the poles, by somewhat less in middle latitudes

TABLE 3.—EXCESS OF GEOGRAPHIC LATITUDE (φ) OVER GEOCENTRIC (φ') AND PARAMETRIC (θ) LATITUDES

$$\begin{aligned}\varphi - \varphi' &= a \sin 2\varphi - b \sin 4\varphi + c \sin 6\varphi \\ &= a \sin 2\varphi' + b \sin 4\varphi' + c \sin 6\varphi' \\ \varphi - \theta &= a' \sin 2\varphi - b' \sin 4\varphi + c' \sin 6\varphi \\ &= a' \sin 2\theta + b' \sin 4\theta + c' \sin 6\theta\end{aligned}$$

where the coefficients and their logarithms have the following values:

Unit of coefficients = 1″

	Value	log₁₀		Value	log₁₀
a	695 6635	2 842 3992	a'	347 8327	2 541 3704
b	1.1731	0 069 34	b'	0 2933	$\bar{1}$ 467 29
c	0 0026	$\bar{3}$.421	c'	0 0003	$\bar{4}$ 52

TABLE 4.—MISCELLANEOUS TERRESTRIAL DATA

Angular velocity of rotation..	72 921 × 10⁻⁶ radians/sec*
Rotational energy	2 160 × 10³⁶ ergs
Rotational energy lost by tidal friction	1.1 × 10¹⁹ ergs/sec†
Work required to dissipate the material of the earth to infinity	2.46 × 10³⁹ ergs
Mean elevation of land above sea-level	825 m
Mean depth of the oceans	3681 m
Mean effective viscosity is not known, but perhaps between	10²⁰ and 10²⁵ poises‡

* Mean solar second.

† Jeffreys, *62*, **221A**: 239, 20; *The Earth, Its Origin, History and Physical Constitution*, 205–237,; 24 Heiskanen, *175*, **18A**: 1; 21

‡ Schweydar, *Veröffentl des Preuss Geodät Inst*, No **79**; 19; Jeffreys, *Monthly Notices, Roy Ast Soc.*, **75**: 648; 15. **76**: 84, 16 **77**: 449, 17; also *The Earth, its Origin, History, and Physical Constitution*, 222, 1924

Rigidity (μ). From the yielding of the solid portions (revealed by observations with horizontal pendulums), and on assumption of incompressibility, Schweydar (Zentralbureau Int. Erdmes., Neue Folge No. 38, 1921) deduces $\mu = 30.8\,(1 - 0.90r^2/a^2) \times 10^{11}$ dynes/cm², and mean effective rigidity = 17.6 × 10¹¹ dynes/cm² (r = distance from center, a = mean radius). To allow for compressibility, these values must be increased by about 20% (Lambert, preliminary, unpublished computations); even then the value computed for the outer shell of half-radius thickness is much less than that deduced from earthquake data. (*See* Adams and Williamson, Smithsonian Annual Report, 1923.) The discrepancy may arise from Schweydar's assumption of high rigidity in the central portions, which may possibly behave as a fluid. (*See* Knott, *68*, **39**: 157; 19; Sieberg, *Geologische, physikalische und angewandte Erdbebenkunde*, 364; 23.)

GRAVITY DATA

Clarence H. Swick

This section includes: (A) The value of the gravitation constant; (B) the absolute determination upon which the tabulated values of the acceleration of gravity[1] rest; (C) values of the acceleration of gravity (g) at numerous stations well distributed over the surface of the earth, together with a table giving the values of g at sea-level and at various latitudes; and (D) means for computing the variation in g with the distance of the station above, or below, either the surface of the earth or sea-level. In preparing the data, valuable assistance was received from several colleagues. In particular should be mentioned Mr. W. D. Lambert's assistance with section D, and Miss Sarah Beall's and Mr. H. S. Rappleye's assistance with section C.

A. GRAVITATION CONSTANT

The best determinations of the gravitation constant (G)[2] are considered to be those by C. V. Boys (7) and by K. Braun (8) Each used an improved form of the Cavendish apparatus; and they obtained almost identical results, the final values of the two determinations being the same to the fourth significant figure. They found

$$G = 6.658 \times 10^{-8} \text{ cm}^3 g^{-1} \text{ sec}^{-2}$$

which requires that the mean density of earth = 5.527 g/cm³.

B. BASIS OF REFERENCE

The observed values of gravity in Tables 1 and 2 are relative determinations in the Potsdam system, that is, they are based on the value of 981.274 cm/sec² for the pendulum room of the Geodetic Institut in Potsdam, Germany. This value for Potsdam is the result of a large number of careful absolute determinations extending over a series of years. The degree of uncertainty in such absolute determinations is well illustrated by the fact that a similar series of absolute determinations at Vienna, Austria, gave a value 0.016 cm/sec² greater than the one above when referred to Potsdam by relative determinations.

All determinations of gravity should be based on the Potsdam system by means of relative determinations with some station already accurately based on that system. A table of 20 base stations on the Potsdam system is given in *Comptes Rendus l'Association Geodesique Internationale* for 1909, III:25. Most of these stations are included in Table 1.

C. ACCELERATION OF GRAVITY AT SELECTED STATIONS

The stations included in Table 1 are grouped (1) in the order America, Europe, Asia, Africa, Australia, and Oceanic; (2) generally, alphabetically according to countries (United States of America, first); (3) in each subdivision, the stations are arranged alphabetically. Numerals in parentheses, following the name of a subdivision or station refer to the bibliography, and indicate the source from which the data were obtained. If the effect of topography and of isostatic compensation has been computed on the uniform basis of compensation extending to a depth of 113.7 km, the amount of this computed effect is given in the column TC. This effect is the amount by which the actual value of the acceleration would exceed that obtained from Table 2, after correction for elevation by means of equation (1), if there were complete isostatic compensation and if the local distribution of matter were not anomalous.

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[1] Throughout this section the term *acceleration of gravity*, or, briefly, *gravity*, is used, in its commonly accepted sense, to denote the resultant acceleration arising from the gravitational attraction and the rotation of the earth. It is this resultant which is denoted by g

[2] The force (f) of gravitational attraction between two masses (m, m_1) separated by the distance r is $f = G \frac{mm_1}{r^2}$.

TABLE 1.—ACCELERATION (g) OF GRAVITY, POTSDAM SYSTEM

(The effect of topography and of isostatic compensation = TC)

Units: Elevation (h), meters: g, cm/sec²; TC, cm/sec²

Station	Latitude	Longitude	h	g	TC
AMERICA					
United States ([5], [6])					
Albany, N Y. (Public School No. 24)	42° 30 1′	73° 46 1′	61	980 344	−0 006
Apalachicola, Fla (Weather Bureau)	20 43 5	84 58 8	4	979 322	+0 015
Asheville, N C (Postoffice)	35 35 9	82 33 3	670	979 603	+0 026
Atlanta, Ga. (State Capitol)	33 45 0	84 23 3	324	979 524	+0 014
Austin, Tex (University)	30 17 2	97 44 2	189	979 283	−0 001
Baltimore, Md (Johns Hopkins University)	39 17 8	76 37 3	30	980 097	+0 006
Bismarck, N Dak (Will School)	46 48 5	100 47 0	516	980 625	−0 005
Boise, Idaho (High School)	43 37 2	116 12 3	821	980 212	−0 042
Calais, Me (High School)	45 11 2	67 16 9	38	980 631	+0 010
Cambridge, Mass (Harvard College Observatory)	42 22 8	71 7 8	14	980 398	+0 010
Charleston, W Va (High School)	38 20 9	81 37 7	184	979 936	−0 010
Charleston, S C. (S C Military Academy)	32 47 2	79 56 0	6	979 516	+0 016
Charlottesville, Va. (University of Virginia)	38 2 0	78 30 3	166	979 938	+0 002
Chicago, Ill. (Univ of Chicago)	41 47 4	87 36 1	182	980 278	+0 007
Cincinnati, Ohio (Cincinnati Observatory)	39 8 3	84 25 3	245	980 001	+0 002
Cleveland, Ohio (Adelbert College)	41 30 4	81 36 6	210	980 241	0 000
Colorado Springs, Colo. (Colorado College)	38 50 7	104 49 0	1841	979 490	−0 007
Denver, Colo (University of Denver)	39 40 6	104 56 9	1638	979 609	−0 015
Dover, Del (Wilmington Conference Academy)	39 9 7	75 32 0	12	980 099	+0 013
El Paso, Tex (High School)	31 46 3	106 29 0	1146	979 124	+0 001
Galveston, Tex. (Ball High School)	29 18 2	94 47 5	3	979 272	+0 007
Georgetown, Tex (Southwestern University)	30 38 0	97 40 1	231	979 298	+0.002
Goldfield, Nev (High School)	37 42 2	117 14 5	1716	979 456	+0 027
Hartford, Conn (Jarvis Laboratory of Trinity College)	41 44 8	72 41 8	37	980 336	+0 008
Hinsdale, Mont (Public School)	48 23 8	107 5 3	661	980 739	−0 017
Hoboken, N J (Stevens Institute of Technology)	40 44	74 2	11	980 269	+0 008
Indianapolis, Ind (Postoffice)	39 45 9	86 8 8	217	980 090	+0 003
Ithaca, N Y (Cornell University)	42 27 1	76 29 0	247	980 300	+0 005
Kansas City, Mo (Franklin School)	39 5 8	94 35 4	278	979 990	−0 001
Key West, Fla. (Postoffice)	24 33 6	81 48 4	1	978 970	+0 035
Lancaster, N. H (High School)	44 29.5	71 34 3	261	980 486	+0 007
Las Vegas, N Mex (Normal School)	35 35.8	105 12 1	1960	979 204	+0 017
Little Rock, Ark. (Postoffice)	34 45.0	92 16.4	89	979.721	+0.001
Madison, Wis (University of Wisconsin)	43° 4 6′	89° 24 0′	270	980.365	+0 003
Minneapolis, Minn (University of Minnesota)	44 58.7	93 13.9	256	980.597	−0.005
Mount Hamilton, Calif (Lick Observatory)	37 20 4	121 38 6	1282	979 660	+0 120
New Orleans, La (City Hall)	29 57 0	90 4 2	2	979 324	+0 013
New York, N. Y. (Columbia University)	40 48 5	73 57 7	38	980 267	+0.011
Norris Geyser Basin, Wyo (Yellowstone Park)	44 44 2	110 42 0	2276	979 950	+0 031
Pembina, N. Dak (Public School)	48 58 1	97 14 9	243	980 917	−0 009
Philadelphia, Pa (University of Pennsylvania)	39 57 1	75 11 7	16	980 196	+0 009
Pierre, S Dak (High School)	44 21 9	100 20 8	454	980 427	−0 013
Pittsburgh, Pa (Second Ward School)	40 27 4	80 0 6	235	980 118	0 000
Point Isabel, Tex	26 4 7	97 12 4	8	979 076	+0.015
Portland, Oreg (Custom House)	45 31 4	122 40 7	8	980 646	−0 016
Potsdam, N Y. (Clarkson School of Technology)	44 40 1	74 58 8	130	980 571	−0 004
Princeton, N J (Princeton University)	40 21 0	74 39 5	64	980 178	+0.013
Richmond, Va (Postoffice)	37 32 2	77 26 1	30	979 960	+0 010
St Louis, Mo (Washington University)	38 38 0	90 12 2	154	980 001	+0 001
Salt Lake City, Utah (Temple Block)	40 46 1	111 53 8	1322	979 803	−0 041
San Francisco, Calif. (Davidson Observatory)	37 47 5	122 25 7	114	979 965	+0.045
Sandpoint, Idaho (Farmington Central School)	48 16 4	116 33 3	637	980 680	−0 044
Seattle, Wash (Washington State University)	47 39 6	122 18 3	58	980 733	−0.020
Springfield, Ill. (Edwards Public School)	39 47 7	89 39 5	183	980.089	+0.005
State College, Pa. (Chemistry Physics Building)	40 47 9	77 51 8	358	980.124	+0.010
Terre Haute, Ind (Rose Polytechnic Institute)	39 28 7	87 23 8	151	980 072	+0 001
Washington, D C (U S C. and G S, base station)	38 53 2	77 0 5	14	980 112	+0.004
Washington, D C (Bureau of Standards)	38 56.3	77 4 0	103	980 095	+0.012
Wilmington, N. C (Court House)	34 14 2	77 56 6	9	979 663	+0.023
Worcester, Mass. (Worcester Polytechnic Institute)	42 16 5	71 48 5	170	980 324	+0.018
Yavapai, Ariz (Yavapai Point)	36 3 9	112 7.1	2179	979 192	+0.034
Alaska ([4])					
Fort Egbert, Eagle City	64 47.4	141 12.4	269	982.183	−0.042
Percy Islands, Southeast Alaska	54 55.8	131 35.3	4	981.524	−0.013

Station	Latitude	Longitude	h	*g*	TC
Point Young, Southeast Alaska.	58° 11.5′	134° 33 4′	7	981 757	-0 054
Quiet Harbor, Southeast Alaska . . .	56 14 1	132 39 6	4	981 624	-0 034
St. Michael .	63 28 5	162 2 4	1	982 192	-0 004
St. Paul Island .	57 7 3	170 16 6	10	981 726	+0 011
Canada (6, 20, 21, 22)					
Arctic Red River, N W. Ter.	67 26 6	133 44 2	41	982 434	-0 026
Banff, Alta	51 10 9	115 34 5	1376	980 753	-0 012
Calgary, Alta. .	51 2.7	114 3 8	1044	980 823	-0 022
Charlottetown, P E. I	46 13 9	63 7 5	8	980 733	+0 013
Chipewyan, Alta.	58 42 7	111 8 8	229	981 723	-0 012
Good Hope, N. W. Ter	66 15.3	128 38 2	50	982 340	-0 029
Halifax, N. S	44 40 8	63 33 8	9	980 574	+0 008
Kenora, Ont . .	49 46 0	94 30 0	330	980 974	+0 018
Kingston, Ont. (City Hall) . . .	44 14 6	76 28 8	79	980 530	+0 008
Liard River, B. C	59 58 7	123 17 5	160	981 790	-0 059
Moose Jaw, Sask	50 23 4	105 31 8	511	980 943	+0 003
Norman, N. W. Ter.	64 54.0	125 31 2	87	982 214	-0 036
Ottawa, Ont. (Dominion Observatory, base station)	45 23 6	75 43 0	83	980 618	0 000
Peace River, Alta	56 14.1	117 17 2	324	981 482	-0 038
Port Arthur, Ont. (Masonic Building)	48 26 0	89 13 0	189	980 820	-0 014
Providence, N W Ter	61 21 2	117 39 2	156	981 955	-0 018
Resolution, N W Ter	61 10 1	113 40 5	152	981 942	-0 009
Revelstoke, B. C	50 59 8	118 11 8	453	980 903	-0 080
St Jérôme (Chateau Larose)	45 46 6	74 0 0	107	980 681	+0 006
St. John, N. B. (Meteorological Observatory) . . .	45 16 0	66 5 0	33	980 663	+0 016
Sault Ste. Marie, Ont (City Hall)	46 30 4	81 19 2	186	980 680	-0 005
Simpson, N. W. Ter	61 51 6	121 20 8	132	982 004	-0 023
Sydney, N S	46 8 4	60 11 8	12	980 731	+0 014
Vancouver, B C	49 16 8	123 6 8	6	980 949	-0 016
Winnipeg, Man	49 54 1	97 8 0	231	980 990	+0 002
Woodstock, N B (Armoury)	46 9 0	67 34 5	56	980 699	+0 008
Woodstock, Ont. (Market)	43 8 6	80 47 0	299	980 352	-0 002
Central and South America (2)					
Bahía Blanca, Argentina . .	38 47 1 S	62 15 0	2	980 061	
Buenos Aires, Argentina	34 36 5 S	58 22 2	2	979 669	
Bahia, Brazil	12 58 5 S	38 31 0	4	978 331	
Panama, Canal Zone	8 54 9	79 31 9	6	978 243	
Valdivia, Chile	39 53.4 S	73 28 3	10	979 920	
Valparaiso, Chile	33 1 8 S	71 38 5	60	979 609	
Callao, Peru	12 4 1 S	77 15 8	1	978 375	
Acajutla, Salvador.	13 34 7	89 50 4	12	978 303	
Montevideo, Uruguay	34 54 5 S	56 12 9	1	979 772	
Kanada *see* Canada.					
EUROPE					
Allemagne, *see* Germany					
Angleterre, *see* Great Britain.					
Austria (2, 6)					
Brenner	47 0 3	11 30.5 E	1372	980 353	
Dalaas	47 8	9 59 E	838	980 454	
Grafenstein	46 37	14 28 E	417	980 614	
Mixnitz. .	47 19.8	15 22 E	445	980 657	
Ober-Drauburg	46 45	12 58 E	617	980 555	
Stilfserjoch (Stelvio Pass) .	46 31 8	10 27 4 E	2760	980 045	0 152
Vienna (base station)	48 12 7	16 21.5 E	183	980 860	
Waidhofen	47 57.7	14 46 7 E	352	980 750	
Wien (base station)	48 12.7	16 21 5 E	183	980 860	
Wolfsthal .	48 8.3	17 0 5 E	146	980 904	
Belgium (2)					
Brussels.	50 51 0	4 22 E.	102	981 112	
Czechoslovakia (2)					
Böhmerwald .	49 40 1	12 59 3 E.	537	980 921	
Cebon.	50 0.9	13 0.4 E.	822	980 906	
Karlowitz	49° 21 9′	18° 18 7′E	510	980 890	
Mount Hora	49 10 3	15 42 4 E	710	980 845	
Rosenau	48 39 1	20 32 E	281	980 871	
Denmark (2)					
Copenhagen (Sternwarte, base station)	55 41 2	12 34 7 E	14	981 559	
Frederikshavn	57 27 1	10 32 2 E	15	981 740	
Magleby	54 47 3	10 43 0 E	14	981 502	
Peders Kirke	55 1 6	14 58 8 E	12	981 533	
Trige	56 15 2	10 9 5 E	91	981 618	
Vinding .	55 40 3	9 34 5 E	78	981 575	
Deutschland, *see* Germany					
England, *see* Great Britain					
Espagna, *see* Spain					
Finland (2)					
Helsingfors (Observatory)	60 9 7	24 57 3 E	20	981.912	
Uleåborg	65 1 2	25 29 1 E.	9	982 262	
Viborg (Viipuri)	60 42 9	28 43 7 E	12	981 928	
Fiume (2)	45 20 0	14 25 8 E	10	980 630	
France (2, 3)					
Arcachon	44 39 6	1 10 4	24	980.586	
Aurillac, Lyceum	44 56 8	2 26 6 E	640	980.483	
Bayonne	43 29 7	1 28 0	3	980.475	
Bordeaux (Observatoire)	44 50 1	0 31 4	72	980.572	
Coutras	45 2 5	0 7 9	13	980.591	
Jonzac	45 26 7	0 26 0	35	980 647	
Langon	44 32 7	0 15 3	25	980 561	
Lahons	49 50 0	2 45 E	106	981 038	
Lyon	45 41 0	4 47 E	286	980 629	
Marseille (Observatoire)	43 17 9	5 23 E	61	980 482	
Metz	49 7 0	6 10 7 E.	175	980 957	
Meudon (Observatoire)	48 48 3	2 13 9 E	130(?)	980.919	
Mont Blanc (Observatoire)	45 50	6 52 E	4807	979 401	
Mont-Louis	42 31 0	2 7 E	1620	979 990	
Nice (Observatoire)	43 42 8	7 18 E	367	980 471	
Paris (Observatoire, base station)	48 50 2	2 20 3 E	61	980.943	
Port-Vendres	42 50 9	3 6 E	25	980 456	
Rosendaël-les-Dunk	51 2 9	2 24 E	20	981.170	
Soulac	45 31 0	1 7.4	8	980 655	
Strasbourg (base station)	48 35 0	7 46 1 E	137	980 904	
Valence	44 56	4 53 E	125	980 562	
Germany (2, 6)					
Alter Bruch	50 45 7	15 44 6 E	917	980.030	+0 060
Bremen	53 5 0	8 49 2 E	0	981 341	
Brocken	51 48 0	10 37 E	1140	981 015	+0 088
Coburg	50 16 0	10 58 E	290	981.015	
Gottingen (Sternwarte)	51 32 0	9 57 E	162	981 176	
Grimmen	54 6 9	13 2 7 E	11	981.434	
Hamburg (Seewarte)	53 32 8	9 58 3 E	24	981 375	
Helgoland	54 10 8	7 53 1 E	51	981 410	
Immenstaad	47 40 0	9 22 1 E	403	980 709	
Jena	50 55 6	11 35 2 E	154	981 123	
Karlsruhe	49 0 7	8 24 7 E	114	980 967	
Kiel (Sternwarte)	54 20 5	10 9 E	41	981 464	
Kirchhain	51 38 3	13 33 5 E	98	981.235	
Kolberg	54 11 3	15 35 8 E	8	981 453	
Königsberg (Sternwarte)	54 42 8	20 29 8 E	22	981.477	
Leipzig	51 20.1	12 23.5 E	115	981 180	
Lüdenhausen	52 4 3	9 0.0 E	205	981 242	
Munich	48 8 7	11 36 6 E	525	980 733	
Münster	51 57.9	7 37.9 E	62	981 233	
Neumünster	54 4.4	10 0 E.	25	981.427	
Potsdam (Geodetic Institute, base station) .	52 22 9	13 4.1 E	87	981.274	
Scharfenstein .	51 50.0	10 36.0 E	623	981.130	+0 041
Schneekoppe	50 44 2	15 44.6 E	1605	980.776	+0 110
Schlagrund .	52 52 8	15 48.0 E	109	981 278	
Stuttgart	48 46 9	9 10.5 E	247	980 901	
Waldsee .	47 55	9 45.3 E	590	980.706	

Station	Latitude	Longitude	h	g	TC
Great Britain (2)					
Edinburgh, Scotland (Observatory)	55° 57.4′	3° 9 4′	104	981 584	
Glasgow, Scotland (University)	55 51 5	4 14 0	61	981.605	
Greenwich, England (Observatory)	51 28 6	0 0 0	48	981 184	
Kew, England (Observatory)	51 28 1	0 19	5	981 144	
Plymouth, England	50 22.2	4 8 4	43	981 148	
Holland, *see* Netherlands					
Hungary (2)					
Budapest	47 29 5	19 3 6 E	108	980.852	
Kis-Komárom	46 32 9	17 10 7 E	115	980.745	
Italy (2, 6)					
Alba	44 42 0	8 2 3 E	169	980 444	
Arona	45 45 8	8 34 1 E	210	980 629	
Bologna (Università)	44 29 8	11 21 3 E	51	980 450	
Brenner (*see* Austria)					
Catania, Sicily	37 30.2	15 4 7 E	43	980 065	
Castellammare di Stabia	40 41 6	14 28 7 E	4	980 321	
Domo d'Ossola	46 7 0	8 18 4 E	276	980 598	
Florence	43 46 8	11 15 2 E	48	980 510	
Genoa (Instituto Idrografico)	44 25 1	8 55 3 E	93	980.573	
Livorno (Leghorn)	43 32 0	10 18 5 E	6	980 531	−0 018
Milan (Osservatorio)	45 28 0	9 11 5 E	141	980 569	
Padua (Osservatorio, base station)	45 24 0	11 52 3 E	19	980 658	
Palermo, Sicily	38 6 9	13 22 0 E	20	980 069	
Pola	44 51 8	13 50 7 E	28	980 626	
Pracchia	44 8 0	10 54 3 E	627	980 378	
Romagnano	45 38 1	8 23 8 E	266	980 620	
Rome	41 53 5	12 29.7 E	49	980 367	−0 012
San Remo	43 49 1	7 46.5 E	23	980 505	
Stilfserjoch, *see* Austria					
Stromboli, Lipari Is	38 48.2	15 14.1 E	48	980 212	
Turin	45 4 1	7 41 8 E	233	980 540	
Jugoslavia, *see* Yugoslavia					
Netherlands (24)					
Amsterdam (Université)	52 21 9	4 54 7 E	0	981 288	
Bergen op Zoom (Cathédrale)	51 29 7	4 17 3 E	10	981 212	
Breda (Académie Militaire)	51 35 5	4 46 5 E	1	981 213	
De Bilt (Institut Météorologique, base station)	52 6 2	5 10 7 E	2	981.267	
Delft (Institut Géodésique)	52 0 6	4 22.1 E	2	981 264	
Gronigen (Université)	53 13.2	6 34.0 E	5	981 348	
Hollander (Sanatorium Hellendoorn)	52 24.2	6 25 0 E	11	981 296	
Leeuwarden (Friesche Levensverzekering)	53 12 3	5 48 3 E	1	981 348	
Leiden (Observatoire)	52 9 4	4 29 1 E	2	981 273	
Maastricht (Hôtel de Ville)	50 51.2	5 41 6 E	49	981 140	
Middelburg (États Prov.)	51 30 0	3 36 8 E	6	981 215	
Oldenzaal (Église Plechelmi)	52 18 8	6 55.8 E	47	981 282	
Schoorl (École primaire)	52 42.1	4 41 6 E.	9	981 312	
Sittard (Ambachtsschool)	50 59.8	5 51 6 E.	48	981 148	
Sleen	52 46.5	6 48.1 E	16	981 318	
Terschelling (École Navale)	53 21 6	5 12.9 E	6	981 376	
Ubagsberg	50 51 0	5 57 2 E.	101	981 108	
Utrecht (Observatoire)	52 5.2	5 7 8 E.	5	981 263	
Weert (Église catholique)	51 15.3	5 42.5 E.	33	981 161	
Winschoten	53 8 7	7 2.4 E.	0	981.346	
Norway (2, 6)					
Bergen (Sternwarte)	60° 23.9′	5° 18.3′ E.	38	981.922	
Christiansund	63 6.6	7 44.2 E.	20	982.175	
Dambaas	62 4.6	9 8.3 E.	643	981.892	
Florö	61 35.8	5 2.4 E.	10	982.071	
Langenaes	69 1 2	15 8.7 E.	8	982.640	
Laredal	61 6.3	7 27.9 E.	7	981.942	
Mehavn	71 1.3	27 47 E.	10	982.688	
Oslo (Christiania) (Sternwarte, base station)	59 54 7	10 43.5 E.	28	981.927	
Oxö	58 4 3	8 3.5 E.	10	981.763	
Rörvik	64 51 9	11 14 3 E.	10	982.313	
Sand	59 29 1	6 15.7 E.	14	981 853	
Sannesjöen	66 1 3	12 38.8 E.	12	982.351	
Sörvaagen	67 53 6	13 2 E.	19	982.622	+0.0
Stavanger	58 58	5 44.3 E.	11	981.845	
Triset	50 25.8	8 10.8 E.	115	981.795	
Österreich, *see* Austria					
Olanda, *see* Netherlands					
Paési Bássi, *see* Netherlands.					
Pays-Bas, *see* Netherlands					
Poland (2)					
Bedzin	50 19.3	19 8.7 E.	256	981.058	
Kraków (Sternwarte)	50 3 9	19 57 6 E.	205	981.054	
Lwów (Lemberg)	49 50 2	24 0.0 E.	314	980.911	
Tuchla	48 55.2	23 29 E.	540	980.789	
Portugal (18)					
Camposancos	41 53 2	8 49 0	9	980.383	
Lisbon	38 42 5	9 11 3	75	980.088	
Oporto	41 8 2	8 36.1	94	980 290	
Praia da Rocha	37 7 0	8 32 7	17	980.005	
Rumania (2)					
Borsa	46 56.9	22 42 E.	379	980 711	
Bucharest (Bucuresti)	44 24 6	26 6.8 E.	83	980.553	
Elesd	47 2 5	22 22 E.	225	980.794	
Maros-Ludas (Ludos)	46 28 1	24 6 E.	281	980.715	
Russia and Siberia (2, 11)					
Alexandropol	40 47 0	43 49 7 E	1519	979.785	
Archangel	64 34	40 31 0 E	5	982.278	
Astrakhan	46 21.0	48 2 7 E.	−21	980.774	
Byelgorod	50 36.1	36 35 9 E	203	981.038	
Dagarskoje (Lake Baikal), Siberia	55 42 2	109 54 E	465	981 32	
Erivan	40 10 7	44 32 8 E	990	979.880	
Gorjätschinskoi, Siberia	52 59.4	108 18 0 E	470	981.178	
Irkutsk, Siberia (Meteorological Observatory)	52 16 5	104 16 5 E.	470	981.096	
Kazan (Observatory)	55 47.4	49 7 3 E	70	981.572	
Kingisepp	59 22.5	28 35.7 E.	16	981.858	
Leningrad, *see* St Petersburg.					
Lenkoran	38 45 6	48 51 5 E	−20	980.092	
Listvinichnoe, Siberia	51 51 0	104 52.5 E.	465	981.051	
Moscow (Observatory)	55 45 3	37 34.3 E	139	981.562	
Novgorod	58 31 4	31 17.3 E	48	981.780	
Odessa	46 26 4	30 46 4 E	43	980.769	
Pulkova (base station)	59 46 3	30 19.7 E.	71	981.899	
St. Petersburg (Leningrad)	59 56 5	30 17 7 E	3	981 929	
Schaitanskij	56 54 8	59 57.0 E	310	981 641	
Simbirsk	54 19.0	48 24.2 E	181	981.469	
Staraya Russa	57 59 4	31 22 E.	23	981.747	
Tartu (Dorpat, Yuriev), (Observatory)	58 22 8	26 43.2 E.	50	981.793	
Tiflis (Physical Observatory)	41 43.1	44 47.8 E	412	980.176	
Tver	56 51.2	35 50.9 E.	136	981 607	
Verevye	58 40.8	32 42 0 E.	113	981.794	
Volkhovo	59 4.2	31 46.2 E.	21	981.826	
Vyshniy Volochok	57 35.1	34 33.1 E.	164	981.695	
Vologda	59 13	39 53.0 E.	118	981.837	
Schweden, *see* Sweden					
Schweiz, *see* Switzerland					
Scotland, *see* Great Britain					

Station	Latitude	Longitude	h	g	TC
Spain ([18])					
Alcázar de San Juan	39° 24.0′	3° 12.0′	648	979 933	
Andújar	38 3.0	4 3 0	207	979 943	
Aranda de Duero	41 40.0	3 40.0	801	980 086	
Arbas	43 0.9	5 45 0	1329	980 132	
Badajos	38 53.0	6 58 0	188	980 050	
Barcelona	41 25.0	2 7.0 E	407	980 240	
Basa	37 30.0	2 45.0	858	979 669	
Cortegana	37 54.0	6 47.0	765	979 895	
Daroca	41 7.0	1 25 0	770	980 038	
Lérida	41 37.0	0 38 0 E.	165	980 260	
Llansá	42 22.0	3 9 0 E.	6	980 431	
Málaga	36 43.0	4 25 2	61	979 918	
Plasencia	40 2.0	6 3 0	369	980 073	
Puigcerdá	42 25.0	1 54 7 E	1190	980 055	
Roncal	42 49.0	0 59 6	675	980 228	
Salamanca	40 58.0	5 39 0	805	980 057	
Salou	41 4 0	1 9 0 E.	2	980 268	
San Fernando	36 28.0	6 12 3	44	979 843	
Santander	43 29 1	3 49 0	10	980 503	
Seville	37 23 0	5 59 0	11	979 965	
Tarita	36 0 0	5 37 0	29	979 748	
Toledo	39 51 0	4 1 0	520	980 015	
Torrejón	38 0 1	0 39 1	2	980 032	
Valencia	39 20 0	0 23 0	6	980 127	
Valladolid	41 39 0	4 43 0	695	980 111	
Vivero	43 39 0	7 35 0	12	980 553	
Suede, *see* Sweden					
Suisse, *see* Switzerland.					
Svézia, *see* Sweden.					
Svizzera, *see* Switzerland.					
Sweden ([2])					
Haparanda	65 49 7	24 9.6 E.	4	982 337	
Hernösand	62 37 8	17 57 0 E	25	982 082	
Lund (Sternwarte)	55 41 9	13 11 3 E	32	981 564	
Stockholm (Sternwarte, base station)	59 20 6	18 3.5 E	45	981 843	
Upsala (Sternwarte)	59 51 5	17 37 6 E	20	981 910	
Switzerland ([6, 23])					
Basel (base station)	47 33 6	7 34 8 E	277	980 788	
Bern (Landestopographie)	46 56 5	7 26 8 E	522	980 622	
Bironico	46 7 4	8 55 7 E.	473	980 580	
Brusio	46 15.3	10 7.7 E.	721	980 429	
Burgdorf (Technikums)	47 3 5	7 37.2 E	558	980 633	
Chanrion (Klubhütte)	45 56.3	7 22.9 E	2435	980 107	+0 113
Eggishorn (Hotel Jungfrau)	46 25 2	8 6.8 E	2187	980 169	+0 086
Frauenfeld (Kantonsschule)	47 33 3	8 54 2 E	431	980 703	
Fribourg (Universität)	46 47 6	7 9.4 E.	633	980 584	
Gornergrat	45 59.0	7 46 8 E	3016	979 992	+0 165
Grand St. Bernard	45 52 1	7 10 4 E	2473	980 072	+0 131
Geneva (Sternwarte)	46 12 0	6 9 2 E	402	980 592	
Gsteig (Hotel Sanetsch)	46 23.2	7 56 2 E	1185	980 396	−0 001
Landquart (Schulhaus)	46 57.8	9 32.6 E	520	980 523	
Lausanne (Ecole de Chimie et de Physique)	46 31.5	6 38 2 E	531	980 599	
Les Verrières	46 54 3	6 28 8 E	928	980 573	
Lungern (Schulhaus)	46 47.1	8 9.6 E.	714	980 515	
Luzern (Kantonsschule)	47 3.0	8 18.2 E.	434	980 626	
Neuchatel (Sternwarte)	47 0.1	6 57.3 E.	487	980 653	−0 026
Rivera	46 7.4	8 55.7 E	473	980 580	
St. Maurice (Hotel du Simplon)	46 13.0	7 0.2 E	422	980 512	−0 130
Simplonhospiz	46 14.9	8 1 9 E.	1998	980 202	+0 076
Sion (Collège)	46 14.1	7 21.5 E.	514	980 480	−0 082
Stilfserjoch, *see* Austria.					
Truns (Schulhaus)	46 44.6	8 59 4 E.	859	980.432	
Zermatt	46 1.5	7 45.0 E.	1603	980 250	−0.007
Zernez (Schloss)	46 42.0	10 5.8 E.	1473	980.308	
Zürich	47 22.7	8 33.1 E.	463	980 676	
Tcheco-Slovaquie, *see* Czechoslovakia.					

Station	Latitude	Longitude	h	g	TC
Ungarn, *see* Hungary					
Ungheria, *see* Hungary.					
Yugoslavia ([2])					
Marburg (Maribor)	46° 34′	15° 39′ E.	270	980.708	
Ragusa (Dubrovnik)	42 38 6	18 6 E	47	980.394	
Serajevo	43 48.2	18 19.7 E.	511	980.389	
ASIA					
Giappóne, *see* Japan					
China ([2])					
Hankow	30 35.5	114 17.5 E	73(?)	979.369	
Hongkong	22 18 2	114 10 5 E.	33	978.771	
Port Arthur	38 47 9	121 22.3 E.	1	980.128	
Shasi	30 18 1	112 14.8 E.	122(?)	979 303	
Weihaiwei	37 30 0	122 11 0 E.	1	979.993	
Zikawei, Observatory	31 11 6	121 25.8 E.	4	979.437	
India ([6, 9])					
Agra	27 10 3	78 1 1 E.	163	979.058	−0.018
Allahabad	25 25 9	81 55 E.	88	978.945	−0.021
Badnur	21 54 2	77 54.2 E	641	978.609	+0.018
Chatra	24 12 7	88 23.4 E.	30	978.880	−0.019
Colaba	18 53 8	72 48.8 E	10	978.643	0.000
Cuttack	20 20 1	85 52 0 E.	28	978.661	0.000
Dehra Dun	30 19 5	78 3 2 E.	682	979.065	−0.060
Dolhpur	26 42 0	77 54.8 E.	176	979.001	−0.015
Gesupur	28 33 0	77 42 0 E.	211	979.127	−0.025
Jacobabad	28 16 6	68 27.1 E.	56	979.188	−0.024
Jalpaiguri	26 31 3	88 44.2 E.	82	978.924	−0.093
Jubbulpore	23 8.9	79 59 E.	447	978.721	−0.002
Kalianpur	24 7.2	77 39.3 E.	537	978.779	+0.011
Madras	13 4.1	80 14 9 E.	6	978.281	+0.040
Majhauli	26 17.8	83 58 E.	67	978.930	−0.037
Mian Mir	31 31.6	74 22.5 E	216	979.385	−0.033
Moghal Sarai	25 17 0	83 6 E.	78	978.021	−0.024
Montgomery	30 39 8	73 6.3 E	170	979.323	−0.019
Mussoorie (Camel's Back)	30 27 6	78 4.5 E.	2110	978.795	+0.082
Muzaffarpur	26 7 1	85 25 E.	55	978.936	−0.036
Quetta	30 12 2	67 0.7 E.	1682	978.853	+0.024
Raipur	21 13 9	81 41 E.	304	978.614	+0.001
Rajpur	30 24 2	78 5 8 E.	1012	979.004	−0.066
Sandakphu Peak	27 6 1	88 0.2 E.	3586	978.192	+0.141
Yercaud	11 46 9	78 12 5 E	1369	977.910	+0.116
Japan ([2, 6])					
Aomori	40 49	140 45 E.	1	980.325	
Chofu	34 0	131 0 E.	6	979 691	
Fukushima	37 45	140 27 E.	67	980.022	
Fukuyama	34 30	133 22 5 E.	3	979.711	
Hachinohe	40 31	141 30 E.	21	980.359	+ .049
Hamada	34 54	132 6 E.	3	979.768	
Hamamatsu	34 42 9	137 43 E.	31	979.750	
Himeji	34 50 1	134 42 E.	16(?)	979.754	
Kamakura	35 19.2	139 34 E.	13	979.779	
Kofu	35 39	138 35 E.	270	979 719	
Kurume	33 19.3	130 31 6 E.	11	979 618	
Kyoto	35 1 6	135 47.1 E.	55	979.727	
Matsue	35 30	133 3 E.	23	979.812	
Matsuyama	33 50	132 45 E.	19	979.607	
Mizusawa	39 8.1	141 8 E.	61	980.159	
Nagasaki	32 44 7	129 52.3 E	30	979.594	
Nagoya	35 10.4	136 53 E	14	979.756	
Nikko	36 44	139 38 E.	649	979.780	
Okazaki	34 57.4	137 10 E.	25	979.764	
Shizuoka	34 58.4	138 23 E	23	979.753	
Tokyo (base station)	35 42 6	139 46 0 E	18	979 80[illegible]	
Tsukuba	36 13 4	140 5 8 E.	870	979.781	
Uwajima	33 13	132 34 5 E.	2	979.597	
Wakayama	34 14 2	135 11 0 E.	3	979.704	
Yamada	34 29 6	136 42.8 E.	4	979.727	
Yamagata	38 15	140 16 E.	153	980.027	
Siam ([2, 3, 6])					
Bankok	13 43.9	100 20.4 E.	7	978.278	
Siberia, (*see* Russia, p. 398).					
Turkestan ([2, 6])					
Derbent, Bokhara	38 12 0	67 3.2 E.	1012	979.672	
Kala Khum, Bokhara	38 27 3	70 46 5 E.	1345	979.462	- 0.066
Samarkand	39 39 1	66 58 7 E.	719	979 883	
Sultan-Bend	37 7 5	62 28 0 E.	272	979 798	
Tashkent	41 19.5	69 17 7 E.	478	980.086	
Chardzhui (International Latitude Station)	39 6.2	63 36 1 E.	192	980.014	

Station	Latitude	Longitude	h	*g*	TC
AFRICA					
Egypt and Anglo-Egyptian Sudan (10)					
Abu Hamed	19° 32 0′	33° 19 9′E	339	978 538	
Aswan	24 5 1	32 53 1 E	97	978 879	
Atbara	17 41 9	33 58 0 E	354	978 421	
Helwan	29 51 5	31 20 4 E	104	979 295	
Khartum	15 36 6	32 32 9 E	383	978 308	
Luxor	25 43 1	32 39 3 E	82	978 982	
Minia	28 5 8	30 45 5 E	42	979 155	
Wadi Halfa	21 55 8	31 19 9 E	126	978 728	
Red Sea (2)					
Aden	12 47 3	44 59 3 E	5	978 327	
Harmil Island, Dahlak Archipelago Eritrea	16 28 8	40 8 7 E	4	978 465	
St. John Island (Zebirget)	23 35 8	36 12 0 E	6	979 026	
Mersa Dhiba	25 20 2	34 44 3 E	2	979 007	
Sherm Sheikh (Sinai)	27 51 1	34 16 9 E	2	979 174	
Suez	29 56 0	32 33 4 E	3	979 307	
Sudan, *see* Egypt					
Miscellaneous (2, 3)					
Algiers (Observatory)	36 44 8	3 3 E	213	979 905	
Bizerta, Tunisia	37 16 4	9 52 5 E	7	979 975	
Biskra, Algeria	34 50 0	5 43 E	137	979 617	
Cape Town, U S Af (Observatory)	33 56 1 S	18 28 7 E	11	979 657	
Dar-es-Salaam, Tanganyika Ter	6 49 0 S	39 18 0 E	7	978 117	
Domjo Ndorobbo	3 08 8 S	35 13 2 E	1715	977 549	
Freetown, Sierre Leone	8 29 4	13 14 3	65	978 200	
E Uasso Nyiro, Kenya	1 53 1 S	36 8 2 E	676	977 737	
Johannesburg, U S Af (Observatory)	26 10 9 S	28 4 5 E	1805	978 553	
Kampo, Cameroons, Fr **Equat. Af**	2 21 2	9 40 6 E	3	978 040	
Laghwat, Algeria	33 47 7	2 53 E	755	979 356	
Langenburg, U S Af	9 35 8 S	34 8 6 E	477	977 907	
Libreville, Gabon, Fr **Equat Af**	0 22 3	9 27.2 E	2	977 999	
Loanda, Angola, Portuguese W Af .	8 48 6 S	13 14 1 E	4	978 212	
Lourenço Marques, Mozambique, Portuguese E Af (Observatory)	26 2 5 S	32 19 8 E	55	979 068	
Lüderitz Bay, Southwest Af	26 38 8 S	15 9 7 E	2	979 103	
Monrovia, Liberia	6 19 0	10 48 8	11	978 165	
Mozambique, Portuguese E. Af	15 2 1 S	38 25 E	3	978 451	
Ouled Rhamoun, Algeria	36 10 8	6 41 E	687	979 709	
Pangani, Tanganyika Ter	5 25 8 S	38 58 8 E	7	978 039	
Rio del Rey, Nigeria	4 43 5	8 38 3 E	2	978 087	
Tangier, Morocco	35 46 5	5 48 6	63	979 737	
AUSTRALIA (2, 3, 10)					
Brisbane (Observatory) .	27 28 0 S	153 1 6 E	40	979 148	
Hobart, Tasmania (Observatory)	42 53 6 S	147 22 0 E	58	980 441	
Melbourne (Observatory)	37 49 9 S	144 58 5 E	26	979 987	
Perth..	31° 57.1′S.	115° 50.5′E.	58	979 378	
Sydney	33 51.7 S.	151 12.7 E	43	979 680	
OCEANIC					
Atlantic Ocean and Mediterranean Sea (2, 3, 6, 10)					
Bastia, Corsica ..	42 41 2	9 27 E	20	980 519	
Bridgetown, Barbados	13 4 3	59 36.5	2	978 340	
Catania, Sicily	37 30 2	15 4.7 E	43	980 065	
Fornells, Balearic Islands	40 3 4	4 7.9 E	7	980.283	
Ibiza, Balearic Islands	38 54 3	1 26.1 E.	3	980 146	
Jamestown, St Helena	15 55 S	5 43.7	10	978.712	+0.177
Karajak Glacier, Greenland	70 26 9	50 19 8	20	982 534	
Kingston, Jamaica	17 57 7	76 47 3	2	978 591	
Las Palmas, Canary **Islands**	28 7 0	15 26.0	8	979 385	
Palermo, Sicily	38 6 9	13 22 0 E	20	980.069	
Palma de Mallorca, Balearic **Islands** .	39 34 5	2 39.1 E	23	980 179	
Ponta Delgada, **Azores**	37 43 8	25 40 8	4	980 143	
Reykjavik, Iceland	64 8 5	22 0.3	39	982 273	
St George, Bermuda	32 21	64 40	2	979.806	+0 218
Santa Cruz de la Palma, Canary Islands	28 41 0	17 46 0	12	979.459	
Stromboli, Lipari Islands	38 48 2	15 14 1 E	48	980 212	
Whales Point, Spitsbergen	77 30 4	20 58 8 E	458(?)	982 899	
Valetta, Malta	35 53 8	14 31 3 E	62	979 887	
Indian Ocean, *see* Pacific Ocean.					
Mediterranean Sea, *see* Atlantic Ocean					
Pacific and Indian Oceans (2, 3, 6)					
Auckland, New Zealand	36 50 9 S	174 46 2 E	3	979.962	
Batavia, Java (Observatory)	6 11 0 S	106 49 8 E	7	978.178	
Hobart, Tasmania (Observatory)	42 53 6 S	147 22 0 E	58	980 141	
Honolulu, Territory of **Hawaii** (Observatory)	21 18 1	157 51 8	6	978 946	+0 162
Kudat, British North Borneo	6 53 0	116 50 7 E	2	978.149	
Makassar, Celebes	5 7 3 S	119 24 5 E	2	978 138	
Manila, Philippines	14 34 7	120 38 6 E	3	978 360	
Marau-Sound, Solomon **Islands**	9 49 1 S	160 48 5 E	3	978.319	
Mauna Kea, Hawaiian **Islands**	19 49 2	155 28 8	3081	978.069	+0.469
Numea, New Caledonia	22 16 6 S	166 27 8 E	2	978.877	
Singapore, Straits Settlements	1 16 5	103 50 3 E	21	978.082	
Port Vila, Sandwich **Island,** New Hebrides	17 45 0 S	168 19 0 E	3	978.637	
Winter Quarters, Kaiser Wilhelm II Land	66 2 2 S	89 38 1 E	1	982 388	

Table 2.—Acceleration of Gravity at Sea-level (g_0)

$g_0 = 978.039\,(1 + 0.005294\sin^2\varphi - 0.000\,007\sin^2 2\varphi)$*; Bowie [6]. φ = latitude. Unit of g_0 is cm/sec². Basis: Potsdam system

φ	g_0 cm/sec²	φ	g_0 cm/sec²	φ	g_0 cm/sec²	φ	g_0 cm/sec²	φ	g_0 cm/sec²	φ	g_0 cm/sec²	φ	g_0 cm/sec²	φ	g_0 cm/sec²	φ	g_0 cm/sec²
0° 00′	978.039	10° 00′	978 104	20° 00′	978 642	30° 00′	979.328	40° 00′	980 172	50° 00′	981 071	60° 00′	981 917	70° 00′	982 608	80° 00′	983.060
10	.039	10	109	10	.652	10	341	10	186	10	086	10	930	10	.618	10	.065
20	.039	20	205	20	661	20	354	20	201	20	100	20	943	20	.628	20	.070
30	.039	30	.210	30	.671	30	368	30	216	30	.115	30	956	30	637	30	.075
40	.040	40	215	40	681	40	381	40	231	40	130	40	969	40	.647	40	.080
50	.040	50	.221	50	691	50	.394	50	246	50	.145	50	982	50	.656	50	.085
1 00	978.041	11 00	978.227	21 00	978 701	31 00	979 407	41 00	980 261	51 00	981 160	61 00	981 995	71 00	982.665	81 00	983.089
10	.041	10	232	10	711	10	.420	10	276	10	.174	10	982 008	10	.675	10	.094
20	.042	20	.238	20	721	20	434	20	291	20	.189	20	020	20	.684	20	.099
30	.043	30	.244	30	.731	30	.447	30	306	30	.204	30	033	30	.693	30	.103
40	.043	40	.250	40	742	40	.460	40	321	40	.218	40	046	40	.702	40	.107
50	.044	50	256	50	.752	50	.474	50	336	50	233	50	058	50	.711	50	.112
2 00	978.045	12 00	978 262	22 00	978 762	32 00	979 487	42 00	980 350	52 00	981.248	62 00	982.071	72 00	982.720	82 00	983.116
10	.046	10	.268	10	773	10	.501	10	365	10	262	10	083	10	.729	10	.120
20	.048	20	.274	20	.783	20	515	20	.380	20	277	20	096	20	.738	20	.124
30	.049	30	.280	30	794	30	528	30	395	30	.292	30	108	30	.746	30	.128
40	.050	40	287	40	804	40	542	40	410	40	.306	40	121	40	.755	40	.132
50	.052	50	.293	50	815	50	555	50	425	50	321	50	133	50	.764	50	.136
3 00	978 053	13 00	978 300	23 00	978 826	33 00	979 569	43 00	980 440	53 00	981 335	63 00	982 145	73 00	982.772	83 00	983.139
10	055	10	306	10	837	10	583	10	455	10	350	10	157	10	.780	10	.143
20	.056	20	313	20	848	20	597	20	471	20	364	20	169	20	.789	20	.147
30	.058	30	320	30	859	30	611	30	486	30	379	30	182	30	.797	30	.150
40	.060	40	327	40	870	40	624	40	501	40	393	40	194	40	.805	40	.153
50	.062	50	334	50	881	50	638	50	516	50	407	50	206	50	.813	50	.157
4 00	978.064	14 00	978 341	24 00	978 892	34 00	979 652	44 00	980 531	54 00	981 422	64 00	982 218	74 00	982.821	84 00	983.160
10	.066	10	.348	10	.903	10	666	10	.546	10	436	10	.229	10	.829	10	.163
20	.068	20	.355	20	914	20	680	20	561	20	450	20	.241	20	.837	20	.166
30	071	30	362	30	926	30	694	30	.576	30	465	30	253	30	.845	30	.169
40	073	40	369	40	937	40	708	40	.591	40	479	40	265	40	.853	40	.172
50	076	50	377	50	948	50	722	50	.606	50	493	50	276	50	.861	50	.175
5 00	978 078	15 00	978 384	25 00	978 960	35 00	979 736	45 00	980 621	55 00	981.507	65 00	982 288	75 00	982.868	85 00	983 177
10	081	10	.392	10	971	10	751	10	636	10	521	10	300	10	.876	10	.180
20	083	20	399	20	983	20	765	20	651	20	536	20	311	20	883	20	.182
30	086	30	407	30	994	30	779	30	666	30	550	30	322	30	891	30	.185
40	089	40	.415	40	979 006	40	793	40	681	40	.564	40	334	40	.898	40	.187
50	.092	50	423	50	018	50	807	50	696	50	.578	50	345	50	.905	50	.189
6 00	978 095	16 00	978 430	26 00	979 030	36 00	979 822	46 00	980 711	56 00	981.592	66 00	982 356	76 00	982.912	86 00	983.191
10	098	10	438	10	042	10	836	10	726	10	606	10	368	10	.919	10	.193
20	102	20	.446	20	054	20	850	20	741	20	620	20	379	20	926	20	.195
30	.105	30	.455	30	065	30	865	30	757	30	634	30	390	30	.933	30	.197
40	108	40	.463	40	077	40	879	40	772	40	648	40	401	40	.940	40	.199
50	.112	50	.471	50	090	50	894	50	787	50	661	50	412	50	.947	50	.201
7 00	978.115	17 00	978 479	27 00	979 102	37 00	979 908	47 00	980 802	57 00	981 675	67 00	982 423	77 00	982.953	87 00	983.202
10	.119	10	.488	10	.114	10	922	10	817	10	689	10	434	10	.960	10	.204
20	.123	20	.496	20	126	20	937	20	832	20	703	20	.444	20	.967	20	.205
30	.127	30	.505	30	.138	30	951	30	847	30	.716	30	455	30	973	30	.207
40	131	40	.514	40	151	40	966	40	862	40	730	40	466	40	979	40	.208
50	.135	50	.522	50	.163	50	981	50	877	50	.744	50	.476	50	986	50	.209
8 00	978 139	18 00	978 531	28 00	979 175	38 00	979 995	48 00	980 892	58 00	981 757	68 00	982.487	78 00	982.992	88 00	983.210
10	143	10	.540	10	188	10	980 010	10	907	10	771	10	.497	10	.998	10	.211
20	147	20	549	20	200	20	024	20	922	20	.784	20	.508	20	983 004	20	.212
30	152	30	.558	30	213	30	039	30	937	30	798	30	.518	30	.010	30	.213
40	.156	40	.567	40	.226	40	054	40	952	40	811	40	.528	40	016	40	.214
50	.160	50	.576	50	.238	50	068	50	967	50	825	50	.539	50	022	50	.215
9 00	978.165	19 00	978.585	29 00	979.251	39 00	980 083	49 00	980 981	59 00	981 838	69 00	982 549	79 00	983 027	89 00	983.215
10	.170	10	.594	10	264	10	098	10	996	10	851	10	559	10	.033	10	.216
20	.174	20	.604	20	277	20	113	20	981 011	20	.865	20	569	20	038	20	.216
30	.179	30	613	30	.290	30	127	30	026	30	.878	30	579	30	044	30	.216
40	.184	40	.623	40	.302	40	142	40	041	40	891	40	589	40	.049	40	.217
50	.189	50	632	50	.315	50	157	50	.056	50	.904	50	598	50	.055	50	.217
																90 00	983 217

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* This formula differs slightly (not over one in 100 000) from that proposed by Helmert [14] and quite extensively used. A table similar to this, but based on Helmert's formula is given by Albrecht [1]

D. VARIATION OF GRAVITY WITH ELEVATION AND DEPTH

Elevation; Free Air Method.—If there were no matter projecting above the geoid and the geoid were a smooth ellipsoid of revolution, then the value (g_H) of the acceleration of gravity (cm/sec²) at a height H meters above the surface would be related ([15, 16]) to that (g_0) at the surface, as indicated by equation (1), in which φ is the latitude.

$$g_H = g_0 - (0.000\,308\,55 + 0.000\,000\,22\cos 2\varphi)H + 0.000\,072\left(\frac{H}{1000}\right)^2 \quad (1)$$

This is known as the free air correction. For most purposes it is sufficient to use the approximate formula (2).

$$g_H = g_0 - 0.000\,3086\,H \quad (2)$$

If g_0 is taken from Table 2, the value of g_H obtained for any station by the use of equation (1) will agree fairly well with the true acceleration, if the surrounding topography is not too rugged. In a fairly flat country, the difference will be considerably less than 0.1 cm/sec², except in very rare cases; and even in a mountainous country, the difference will ordinarily be less than 0.2 cm/sec². For stations below sea-level, but not below the surface of the earth, the same formulae apply; but for such stations, H is negative.

More Exact Methods.—In mountainous country, the computed value will be practically as close to the true value as in flat country if an additional term is added to the right hand side of equation (1), to take account of the elevation of the place above or below the general level of the topography within a radius of, say, approximately 160 km. For every 10 m the place in question is above the general level, this term amounts to 0.001 cm/sec², and for every 10 m below the general level, it amounts to −0.001 cm/sec². In computing the height of a coast station above the general level, the water must be considered replaced by an equal mass of rock, of average surface density, resting on the bottom of the ocean.

If it is desired to obtain a somewhat better value for the computed gravity at a place, the correction term just mentioned must be replaced by a correction for topography and isostatic compensation, computed by the method of John F. Hayford ([12]).

A somewhat larger error should be expected in the computed values of gravity on oceanic islands than on the continents. The rocks forming these islands are evidently somewhat heavier than normal in many cases, or the ocean is over-compensated, and the observed values of gravity are therefore usually larger than the computed values. In such cases, an error of 0.3 cm/sec², or possibly even 0.4 cm/sec² in computed values may be expected.

Depth.—As the density of the crust is less than two-thirds the mean density of the earth, the acceleration of gravity increases as we advance into the crust. The mean rate of increase is 0.000 0851 cm/sec² per meter of depth. The actual rate at any place depends upon the density of the crustal material in that locality, and is approximately given by the formula ([13, 17])

$$g_d = g_0 + (0.000\,3086 - 0.000\,0837\rho)d \quad (3)$$

where g_d = acceleration of gravity (cm/sec²) at the depth of d m, and ρ = density (g/cm³).

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(For a key to the periodicals see end of volume)

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AERODYNAMICS

L. J. BRIGGS AND H. L. DRYDEN

Problems in aerodynamics cannot be idealized with the same readiness as problems in mechanics. The side of a building may not be regarded as a thin, flat plate for the purpose of computing the force of the wind, and data for a cylinder of a particular length cannot be directly applied for computing the wind force on a cylinder of some other length. Nearby objects exert an influence which cannot be neglected.

Results obtained for a particular object can be applied strictly only to geometrically similar (definition 6) objects in similar surroundings. Many of the apparent discrepancies among the results of different experimenters are to be attributed to departures from geometrical similarity of the models, to the effects of the supports or other nearby objects, and to differences in the fine structure (turbulence) of the approximately steady air streams, rather than to errors in measuring the force or wind speed. It is not possible to discuss these matters in detail here, and there is no complete discussion available for reference.

SYMBOLS

A	Some specified area
A_r	Aspect ratio
C	A coefficient
C_{cp}	Coefficient of center of pressure
C_d	Coefficient of drag
C_l	Coefficient of lift
C_M	Moment coefficient (see paragraph on air foils)
C_N	Coefficient of force normal to the plane of reference
C_P	Coefficient of power (input)
C_{Pe}	Coefficient of power out-put
C_Q	Coefficient of torque
C_{Qe}	Coefficient of torque load (output)
C_T	Coefficient of force parallel to the plane of reference
C_t	Coefficient of thrust
C. P.	Center of pressure
c	Length of chord of air-foil
D	Diameter
F	Resultant wind force
F_d	Drag = Component of F parallel to wind
F_f	Frictional force
F_l	Lift = Component of F normal to wind and to W
F_N	Component of F normal to the plane of reference
F_T	Component of F parallel to the plane of reference
F_t	Thrust of propeller
F_s	Any component of F
L	Some linear dimension
M	Moment of F about forward (leading) edge
N. A. C. A.	National Advisory Committee for Aeronautics, U. S. A.
n	Number of revolutions per second
P_e	Power developed (output)
P_i	Power input to propeller
P. R.	Pitch ratio
p	Pressure at a point on a surface
p_s	Static pressure of the air
Q	Torque
Q_e	Torque load (output)
q	Dynamic pressure, as indicated by Pitot tube (Fig. 1)
q_e	$\rho V^2/2$ ($= q$ if there is no compression of the air)
R	Reynold's number
S	That dimension of the plane of reference which is at right angles to the wind = Span
T	Temperature
t	Thickness
V	Air speed relative to point considered
V_i	Indicated air speed
W	Width = That dimension of plane of ref-

	ence which is normal to S; *i.e.*, makes least angle with wind
x_c	Distance in the plane of reference, from the leading edge, or its projection to *C. P.*
η	Efficiency
θ_A	Angle of attack
μ	Viscosity
ρ	Density of air when undisturbed by bodies moving relatively to it.
ρ_0	Conventionally chosen "standard" value of ρ
ϕ	A definite but unspecified mathematical function

DEFINITIONS

1. Angle of Attack (θ_A) is the angle which the direction of the wind makes with the plane of reference; it is positive if the wind strikes what is the under side of this plane when the body is in its usual position.

2. Aspect ratio (A_r) = S/W.

3. Center of pressure (*C. P.*) of a body is that point, in the plane of reference, about which the resultant moment of the pressures is zero.

4. Chord (c). See paragraph on airfoils.

5. Coefficient of center of pressure (C_{cp}).

$$C_{cp} = x_c/W; \text{ for airfoil, } C_{cp} = x_c/c.$$

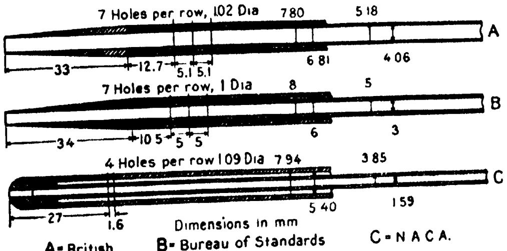


Fig. 1.—Standard Pitot-static tubes.

6. Geometrically similar systems. If two bodies together with their surroundings, are so related geometrically that one system corresponds exactly with a uniformly magnified image of the other, the two systems are said to be geometrically similar.

7. Indicated air speed (V_i) is defined by the relation $q = \rho V^2/2 = \rho_0 V_i^2/2$, where ρ_0 is the "standard" air density.

8. Mean temperature (T_m) of atmospheric air column below Z is that temperature for which the pressure at height Z in an isothermal column of air, pressure at bottom = 760 mm of mercury, would be that actually observed in the atmosphere at Z.

9. Pitch ratio $(P.\ R.)_x$ at any point of the blade of a propeller or of a wind-mill distant x from the axis of revolution is $(P.\ R.)_x = 2\pi x/D \tan\theta_x$, where D is the diameter of propeller or mill wheel, θ_x = angle which face of blade makes with plane of revolution. If $(P.\ R.)_x$ is independent of x, propeller has a constant pitch ratio; if θ_x is independent of x, it has a constant blade angle.

10. Reynold's number (R) = $VL\rho/\mu$, where L is some specified linear dimension. The choice of L depends upon the form of the object, and the problem. R is dimensionless.

CONSTANTS ASSUMED

Standard air density is $\rho_0 = 1.2255$ kg/m³(= 0.002377 slug/ft.³), which is essentially that of dry air, with normal CO_2 content, at 15°C and one atmosphere.

$$\mu/\rho = 1.427 \times 10^{-5}\ \text{m}^2/\text{sec}\ (= 1.535 \times 10^{-4}\ \text{ft.}^2/\text{sec}).$$

For geometrically similar systems $F_x = qL^2\phi(R) = CAq$ (43), where ϕ is independent of the actual size of the system, and q is the value of the dynamic pressure at some specified point. C is a function only of R and of the geometrical form of the system; its value is the same in every self-consistent system of units, and is independent of the actual size of the system. The data in the following tables and graphs apply when all surrounding bodies are so far removed from the one considered that they produce no effect upon F_x.

Reduction of Observations.—To obtain true air speed from speed recorded by cup anemometer, use Table 1. Aerodynamic data are usually reduced to a standard air density (ρ_0). For q, this reduction can be effected by replacing the true air speed (V) by the indicated air speed (V_i) (definition 7), and in most cases the same procedure is amply sufficient for C. *Example:* If V = 100 ft./sec in air at 30°C and 754 mm of mercury, V/V_i = 1.030 (Fig. 2); hence V_i = 97.1 ft./sec and q_0 = 11.20 lb./ft.² (Table 2). Owing to isentropic compression of air at this speed, the actual dynamic pressure (q) is 11.20/0.998 (Table 3) = 11.22 lb./ft.² = 54.78 kg/m².

As a basis for the calibration of altimeters, and for use in the comparison of the performances of aircraft, it is assumed that (1) below a certain altitude (Z_i), the rate of decrease (a) of the temperature (T) with the altitude is a constant; (2) above Z_i, $a = 0$; (3) at $Z = 0$, pressure $= p_0$, temperature $= T_0$. The temperature at $Z_i = T_i$; the mean temperature below Z is T_m. All temperatures are reckoned from absolute zero. Then, if $Z < Z_i$, $T_m = aZ/\log_e(T_0/T)$; if $Z > Z_i$, $T_m = Z/\left(\frac{1}{a}\log_e\frac{T_0}{T_i} + \frac{Z - Z_i}{T_i}\right)$, and for any value of Z, $Z = K\frac{T_m}{T_0}\log_{10}\left(\frac{p_0}{p}\right)$.

The values of these constants define what is called the "standard" atmosphere. There is not entire agreement regarding the values which best represent the average atmospheric condition (28). Those adopted by the governmental aeronautic organizations of the U. S. A. and by many of those of Europe are T_0 = 288°C, T_i = 218°C, p_0 = 760 mm of mercury, $a = 6.500 \times 10^{-3}$°C/m (= 1.9812×10^{-3}°C/ft.), Z_i = 10760 m (= 35332 ft.), K = 19413.3 m (= 63601.8 ft.). These differ slightly from those adopted by the International Commission for Aerial Navigation (see p. 72).

TABLE 1.—ROBINSON CUP ANEMOMETER*

True air speed = V; recorded speed = V_r. If unit is 1 mi./hr, $\log_{10} V = 0.079 + 0.9012 \log_{10} V_r$.

Unit is 1 mi./hr = 1.467 ft./sec = 0.4470 m/sec

V_r	V	V_r	V	V_r	V	V_r	V
1	1.20	26	22.6	51	41.5	76	59.4
2	2.24	27	23.4	52	42.2	77	60.1
3	3.23	28	24.2	53	42.9	78	60.8
4	4.18	29	24.9	54	43.7	79	61.5
5	5.12	30	25.7	55	44.4	80	62.2
6	6.03	31	26.5	56	45.1	81	62.9
7	6.93	32	27.3	57	45.9	82	63.6
8	7.81	33	28.0	58	46.6	83	64.3
9	8.69	34	28.8	59	47.3	84	65.0
10	9.55	35	29.5	60	48.0	85	65.7
11	10.4	36	30.3	61	48.7	86	66.4
12	11.3	37	31.1	62	49.5	87	67.1
13	12.1	38	31.8	63	50.2	88	67.8
14	12.9	39	32.6	64	50.9	89	68.5
15	13.8	40	33.3	65	51.6	90	69.2
16	14.6	41	34.1	66	52.3	91	69.9
17	15.4	42	34.8	67	53.0	92	70.6
18	16.2	43	35.6	68	53.8	93	71.3
19	17.0	44	36.3	69	54.5	94	72.0
20	17.8	45	37.1	70	55.2	95	72.7
21	18.6	46	37.8	71	55.9	96	73.4
22	19.4	47	38.5	72	56.6	97	74.0
23	20.2	48	39.3	73	57.3	98	74.7
24	21.0	49	40.0	74	58.0	99	75.4
25	21.8	50	40.7	75	58.7	100	76.1

* U. S. Weather Bureau type; diameter of cups = 4 in.; centers of cups are 6.72 in. from axis; V_r = 3 times linear speed of centers of cups (3, 32, 33).

TABLE 2.—DYNAMIC PRESSURE ($q = q_0$) FOR INDICATED AIR SPEED V_i

Air compression is negligible, and $q = q_0 = \rho_0 V_i^2/2$ if $V_i < 30$ m/sec (= 100 ft./sec); for greater speeds, q exceeds q_0, see Table 3. Metric units are m, kg, sec. English units are ft., lb., sec. 1 lb./ft.² = 4.882 kg/m²; 1 ft./sec = 0.3048 m/sec.

Metric		English	Metric		English	English							
q_0	V_i	q_0	q_0	V_i	q_0	V_i	q_0	V_i	q_0	V_i	q_0	V_i	q_0
0.063	1	0.00119	42.25	26	0.8038	51	3.093	76	6.868	101	12.13	126	18.88
0.250	2	0.00476	45.56	27	0.8668	52	3.215	77	7.050	102	12.37	127	19.18
0.562	3	0.01070	49.00	28	0.9322	53	3.340	78	7.234	103	12.61	128	19.48
1.00	4	0.0190	52.56	29	0.9999	54	3.467	79	7.421	104	12.86	129	19.79
1.56	5	0.0297	56.25	30	1.070	55	3.597	80	7.610	105	13.11	130	20.09
2.25	6	0.0428	60.06	31	1.143	56	3.729	81	7.801	106	13.36	131	20.40
3.06	7	0.0583	64.00	32	1.218	57	3.863	82	7.995	107	13.61	132	20.72
4.00	8	0.0761	68.06	33	1.295	58	4.000	83	8.191	108	13.87	133	21.03
5.06	9	0.0963	72.25	34	1.374	59	4.139	84	8.390	109	14.13	134	21.35
6.25	10	0.1189	76.56	35	1.457	60	4.280	85	8.591	110	14.39	135	21.67
7.56	11	0.1438	81.00	36	1.541	61	4.424	86	8.794	111	14.65	136	21.99
9.00	12	0.1712	85.56	37	1.628	62	4.571	87	9.000	112	14.91	137	22.32
10.56	13	0.2009	90.25	38	1.717	63	4.719	88	9.208	113	15.18	138	22.64
12.25	14	0.2330	95.06	39	1.808	64	4.870	89	9.418	114	15.45	139	22.97
14.06	15	0.2675	100.0	40	1.902	65	5.024	90	9.631	115	15.72	140	23.30
16.00	16	0.3044	105.1	41	1.999	66	5.179	91	9.846	116	16.00	141	23.64
18.06	17	0.3436	110.3	42	2.097	67	5.337	92	10.06	117	16.28	142	23.97
20.25	18	0.3852	115.6	43	2.198	68	5.498	93	10.28	118	16.56	143	24.31
22.56	19	0.4292	121.0	44	2.302	69	5.661	94	10.51	119	16.84	144	24.66
25.00	20	0.4756	126.6	45	2.408	70	5.826	95	10.73	120	17.12	145	25.00
27.56	21	0.5243	132.2	46	2.516	71	5.994	96	10.96	121	17.41	146	25.34
30.25	22	0.5755	138.1	47	2.627	72	6.164	97	11.18	122	17.70	147	25.69
33.06	23	0.6290	144.0	48	2.739	73	6.336	98	11.42	123	17.99	148	26.04
36.00	24	0.6849	150.1	49	2.855	74	6.511	99	11.65	124	18.28	149	26.40
39.06	25	0.7431	156.3	50	2.973	75	6.688	100	11.89	125	18.58	150	26.75

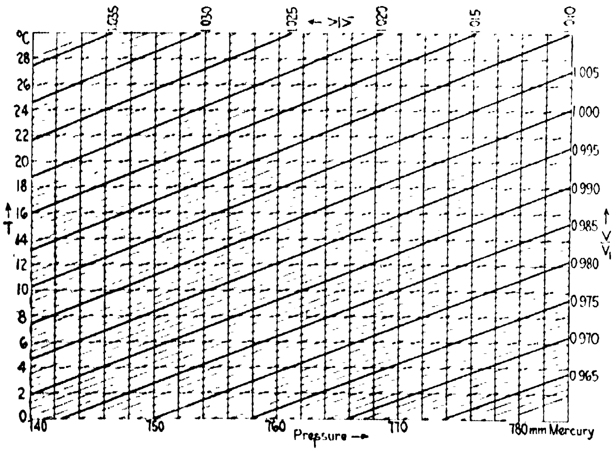


FIG. 2. Ratio of true air speed (V) to indicated air speed (V_i).

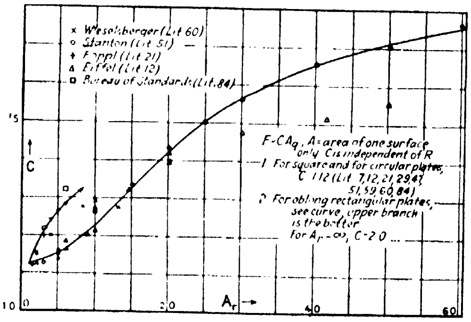


FIG. 3.—Air force: flat plates normal to wind.

TABLE 3.—CORRECTION FOR ISENTROPIC COMPRESSION (63)

Metric (M) unit of V = 1 m/sec; English (E) = 100 ft./sec

V		$\rho v^2/2q$	V		$\rho v^2/2q$
E	M	$= q_0/q$	E	M	$= q_0/q$
1	30	0.998	6	183	0.931
2	61	0.992	7	213	0.907
3	91	0.982	8	244	0.881
4	122	0.969	9	274	0.852
5	152	0.951	10	305	0.822

TABLE 4.—WIND PRESSURE ON STRUCTURES

Reference plane (see below) is normal to wind. $F_N = C_N A q$; A = area of projection of object upon reference plane
Unit of F_N/A = 1 lb./ft.² = 4.88 kg/m²

Object	C_N	F_N/A*
1. Long flat plate	2	30
2. Square flat plate	1.1	16
3. Rectangular prism (1:1:5) (75)	1.6	24
4. Long cylinder	0.8	12
5. Short cylinder	0.7	10

* For V = 76 mi per hr (= 34 m/per sec) true speed = 100 mi. per hr recorded by Robinson anemometer.

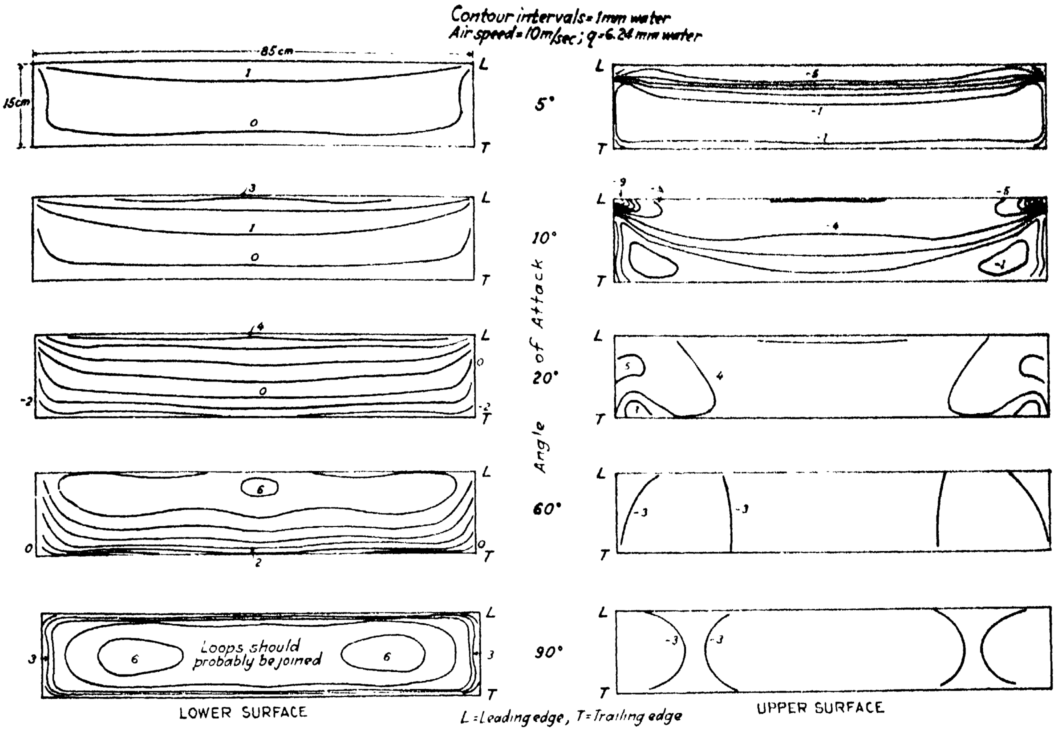

Contour intervals = 1mm water
Air speed = 10m/sec; q = 6.24 mm water
85 cm
15cm
L
T
5°
10°
20°
60°
90°
Angle of Attack
1
0
3
4
-2
6
2
Loops should probably be joined
-5
-1
-9
-4
-3
LOWER SURFACE
L = Leading edge, T = Trailing edge
UPPER SURFACE

FIG. 4. —Pressure distribution oblong, rectangular plate, inclined [12, 13].

Wind Pressure on Structures.—One must consider (1) maximum wind speed to which the structure will be subjected, (2) the value of the coefficient C_N, and (3) the effective exposed area. The first and the third depend upon local conditions; in the third, shielding effects are very important. The value of C_N should be determined from observations upon a model of the actual structure, as experiments upon flat plates are of little value for this purpose. Opinions differ regarding whether, in gusty winds, the maximum value of F_N is determined by the average or by the maximum value of V (**20, 52**). Approximate values of C_N for certain typical cases are given in Table 4, where reference plane for flat plate is surface of plate; for prism, its largest face; for cylinder, the plane through axis and normal to that which contains axis and direction of wind. Object (1) is comparable to such structures as wireless masts and long narrow bridge girders; (2) to thin square signboards; (3) to tall buildings; (4) to chimneys; (5) to cylindrical water tanks.

TABLE 5.—SURFACE FRICTION (F_f) ON THIN FLAT PLATES
(Standard density and viscosity)

F_f ($= \int f dA$) $= 0.0375 \quad AqR^{-0.16} = F_0 A K_w K_v$ (**5,61**) where A = total area (both sides) exposed to air stream, F_0 is a factor depending upon the density and viscosity of the air and upon the units employed, and K_w and K_v are numerical factors determined, respectively, by the width (W) of the plate in the direction of the stream, and by the speed (V). F_0 is independent of the ratio S/W, provided $0.5 < (S/W) < 2$; if $S/W = 30$, F_0 is 10% less than the value given in the table. For effect of roughness (it is great), and for variation of f from point to point see (**22, 24, 32, 53, 54, 55, 62**).

English units $F_0 = 0.0420$ lb/ft.^{2} Unit of F_f = 1 lb.; of A = 1 ft.^{2}; of V = 1 ft./sec				Metric units $F_0 = 0.0311$ kg/m^2 Unit of F_f = 1 kg; of A = 1 m^2; of V = 1 m/sec			
W	K_w	V	K_v	W	K_w	V	K_v
1	1.413	10	0.014	1	1.000	10	1.000
2	1.273	20	0.051	2	0.901	20	3.605
3	1.198	30	0.108	3	0.848	30	7.633
4	1.147	40	0.184	4	0.812	40	13.00
5	1.110	50	0.277	5	0.786	50	19.64
6	1.080	60	0.389	6	0.764	60	27.52
7	1.055	70	0.517	7	0.747	70	36.60
8	1.034	80	0.662	8	0.732	80	46.85
9	1.016	90	0.823	9	0.719	90	58.26
10	1.000	100	1.000	10	0.708	100	70.80
11	0.986	110	1.193	11	0.698	110	84.45
12	0.973	120	1.401	12	0.689	120	99.19
13	0.961	130	1.625	13	0.681	130	115.0
14	0.951	140	1.864	14	0.673	140	131.9
15	0.941	150	2.117	15	0.666	150	149.9
20	0.901	160	2.386	20	0.638	160	168.9
30	0.848	170	2.669	30	0.600	170	188.9
40	0.812	180	2.967	40	0.575	180	210.0
50	0.786	190	3.279	50	0.556	190	232.1
100	0.708	200	3.605	100	0.501	200	255.2

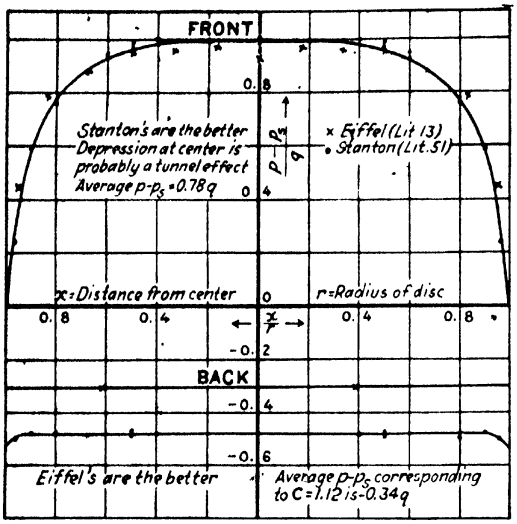


FIG. 5.—Pressure distribution: thin circular disc normal to wind.

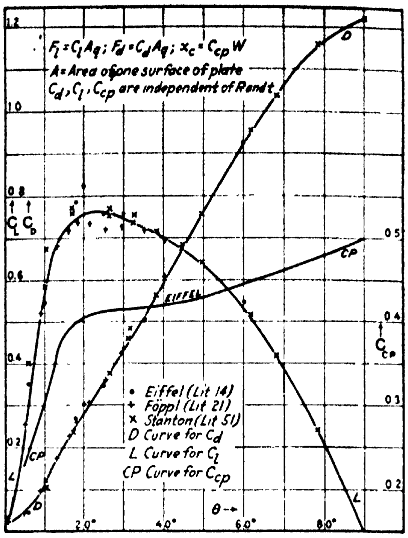


FIG. 7.—Coefficients: inclined, rectangular plates, A_r = 3. (See Table 6.)

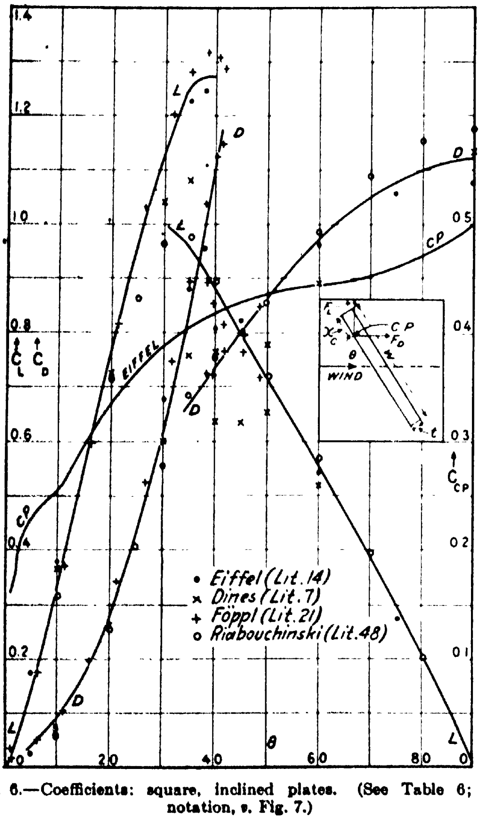


FIG. 6.—Coefficients: square, inclined plates. (See Table 6; for notation, v. Fig. 7.)

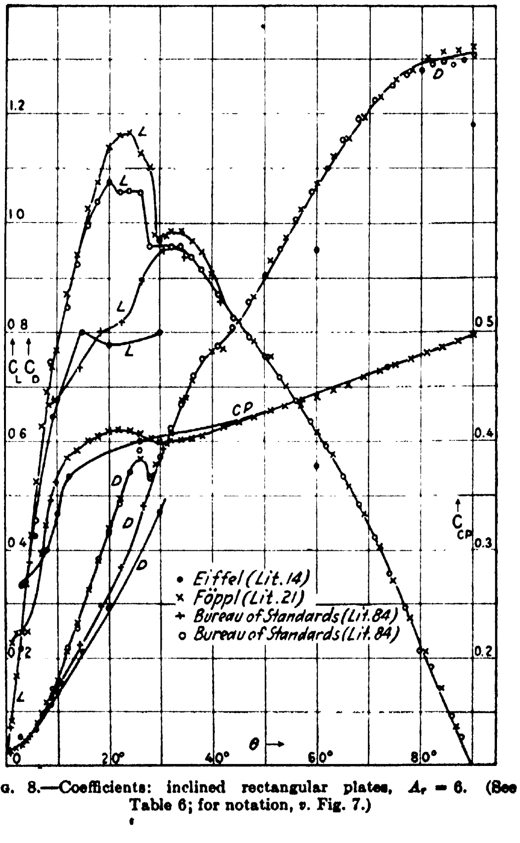


FIG. 8.—Coefficients: inclined rectangular plates, A_r = 6. (See Table 6; for notation, v. Fig. 7.)

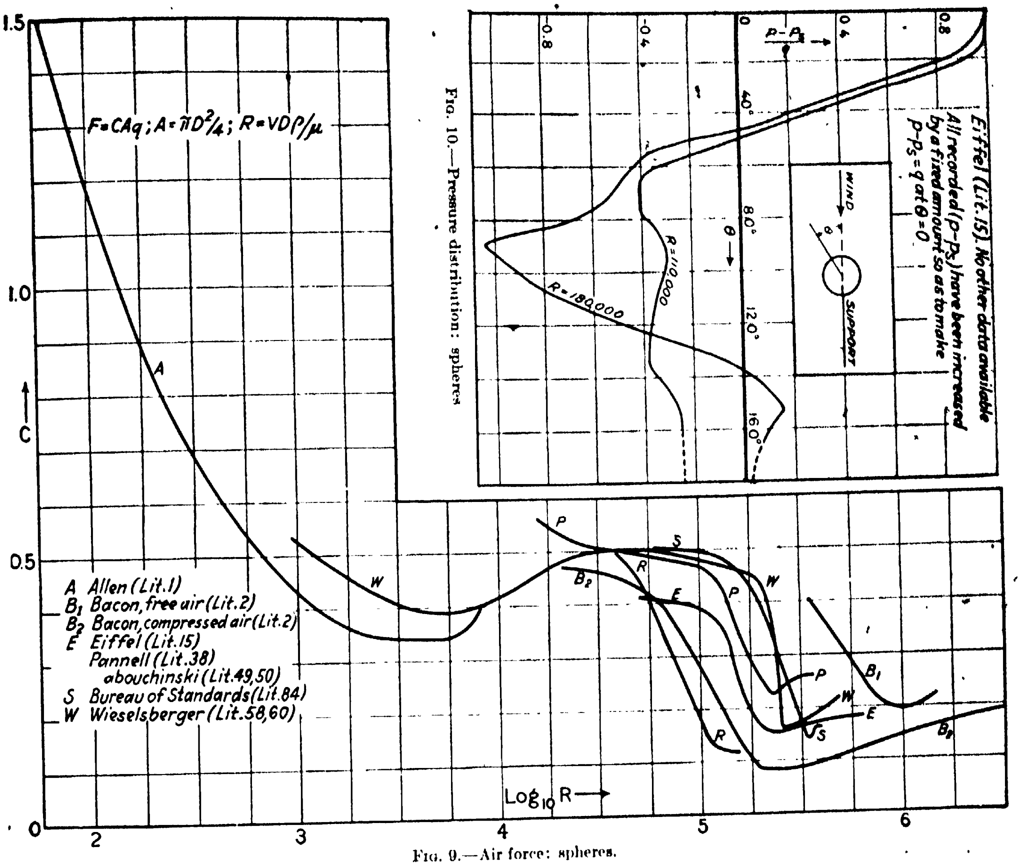


Fig. 10.—Pressure distribution: spheres.

Fig. 9.—Air force: spheres.

Table 6.—Experimental Data; Figures 6, 7, 8

Unit of S and W = 1 cm; of t = 1 mm; of TD = 1 m; of R† = 1000

	Fig. 6				Fig. 7			Fig. 8			
	•	×	+	0	•	×	+	•	×	+	0
S	25	30.5	12	12	45	7.6	36	90	30.5	72	30.5
W	25	30.5	12	12	15	2.5	12	15	5.08	12	5.08
t	3	3.18	1.7		3	0.25	1.7	3	1.17	1.7	1.29
TD*	1.5	∞	2.0	1.2	1.5	0.6	2.0	1.5	1.37	2.0	1.37
R	210	382	55	42	126	10	55	126	64	55	64

* TD = tunnel diameter.

† R is dimensionless.

The flow about a sphere is extremely sensitive to slight changes in the method of support, and to the condition of turbulence of the air stream. Changes in C are associated with changes in the locus of the points at which the smooth flow leaves the surface, forming a highly turbulent region to the rear. The location of this locus is determined solely by the irregularities in the air stream, as there are no sharp edges or other geometrical feature which might serve to fix it.

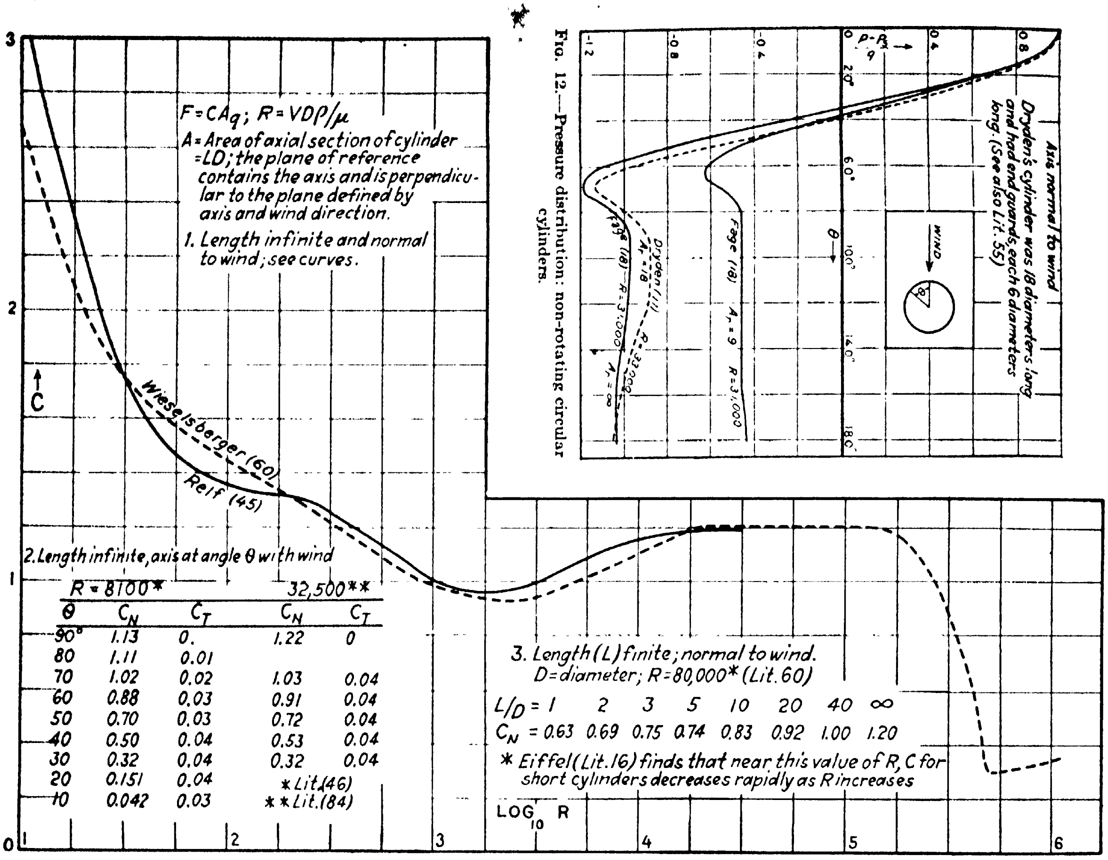
Airfoils.—Aerodynamical characteristics are specified in the same manner as are those of plates. An airfoil's area and angle of attack are conventionally defined with reference to some specified plane. The area of the airfoil is defined as that of its normal projection upon this plane of reference. The length (c) of the projection upon this plane of any fore-and-aft section of the airfoil is called the chord of that section; it is the unit in terms of which all dimensions of that section are expressed. The form of the section is specified by the rectangular coordinates of points upon its boundary; the choice of axes is immaterial, although usually one axis is in the plane of reference. The aspect ratio (A_r) of the airfoil is defined as the ratio of length of span (S) to length of the chord. In addition to the coefficients considered for plates, the moment coefficient $C_M = M/(qAc)$, and the lift-drag ratio (F_l/F_d) are also of importance.

Data are usually given for $A_r = 6$. If $A_r > 3$, then for a given C_l, $\theta_A = \theta'_A + C_l/\pi A_r$ radians, and $C_d = C'_d + C^2_l/\pi A_r$; θ'_A and C'_d are values of θ_A and C_d when $A_r = \infty$; $C_l/\pi A_r$ and $C^2_l/\pi A_r$ are called the induced angle of attack and the induced coefficient of drag, respectively (25, 26, 42, 72).

For airfoils, C_l increases slightly, and C_d decreases very appreciably, as R is increased; C_{cp} remains unchanged. The difference between the values of the coefficients for airfoils of the size used on aircraft and those for models of the size generally employed in laboratory tests, depends upon the form of the airfoil; for a thin, low cambered section (RAF 15), it is small; for a highly cambered section, it is large.

For the effects produced by placing one airfoil near another, as in a biplane combination see (26, 27, 36, 42, 74).

For a complete airplane, the drag introduced by the body, and the moment of tail lift, both vary appreciably with the size of the airplane (6, 67, 73).



$F = CAq$; $R = VD\rho/\mu$

A = Area of axial section of cylinder = LD; the plane of reference contains the axis and is perpendicular to the plane defined by axis and wind direction.

1. Length infinite and normal to wind; see curves.

2. Length infinite, axis at angle θ with wind

	R = 8100*		32,500**	
θ	C_N	C_T	C_N	C_T
90°	1.13	0.	1.22	0
80	1.11	0.01		
70	1.02	0.02	1.03	0.04
60	0.88	0.03	0.91	0.04
50	0.70	0.03	0.72	0.04
40	0.50	0.04	0.53	0.04
30	0.32	0.04	0.32	0.04
20	0.151	0.04		
10	0.042	0.03		

* Lit. (46)
** Lit. (84)

3. Length (L) finite; normal to wind. D = diameter; R = 80,000* (Lit. 60)

L/D =	1	2	3	5	10	20	40	∞
C_N =	0.63	0.69	0.75	0.74	0.83	0.92	1.00	1.20

* Eiffel (Lit. 16) finds that near this value of R, C for short cylinders decreases rapidly as R increases

$\frac{p-p_0}{q}$ →
0.8
0.4
0
-0.4
-0.8
-1.2
20°
60°
100°
140°
180°
θ →
WIND
Axis normal to wind
Dryden's cylinder was 18 diameters long and had end guards, each 6 diameters long. (See also Lit. 55)
Fage (18) $A_r = 9$ R = 31,000
Dryden (11) $A_r = 18$ R = 31,000
Fage (18) R = 31,000 $A_r = \infty$

FIG. 12.—Pressure distribution: non-rotating circular cylinders.

FIG. 11.—Air force: non-rotating circular cylinders.

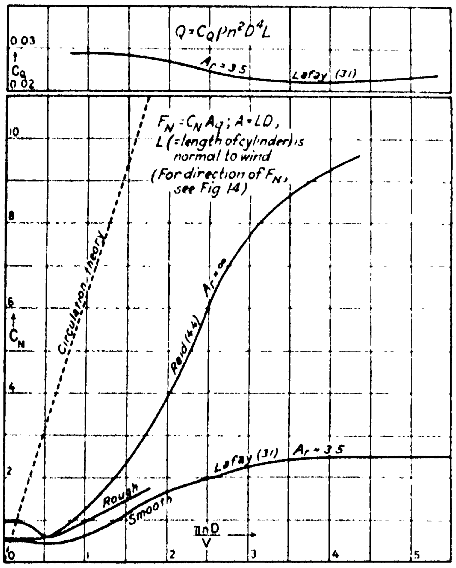


FIG. 13.—Air force: rotating circular cylinders (Magnus effect).

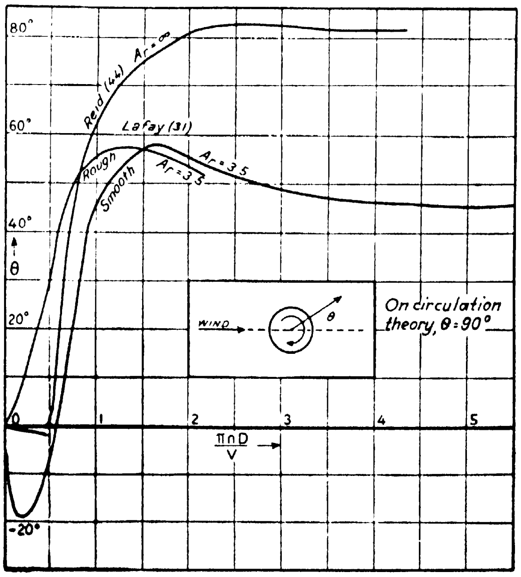


FIG. 14.—Direction of air force: rotating circular cylinders (Magnus effect).

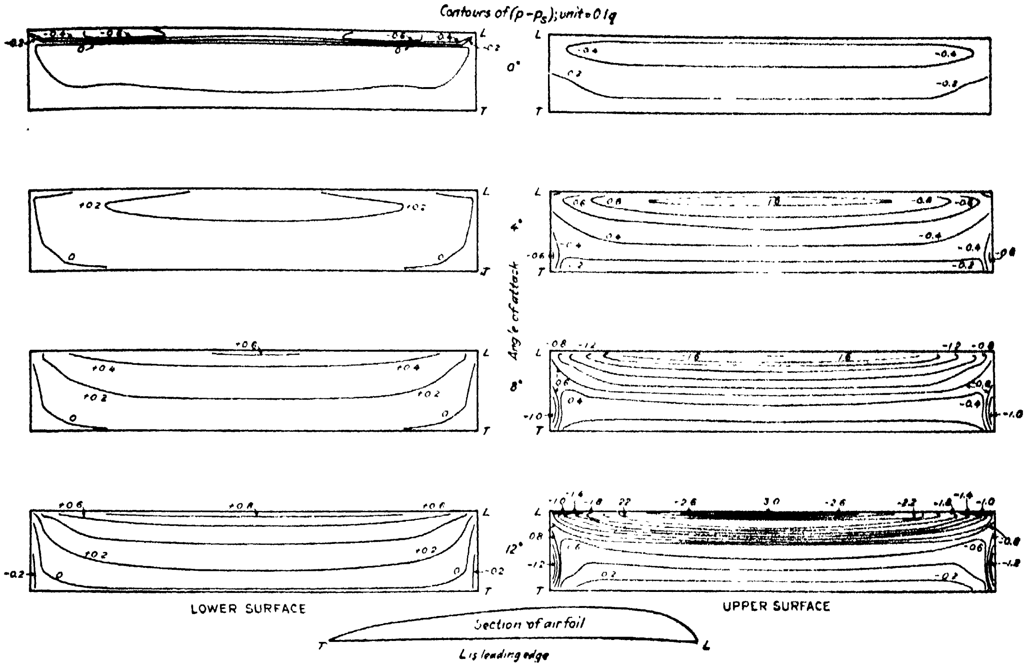
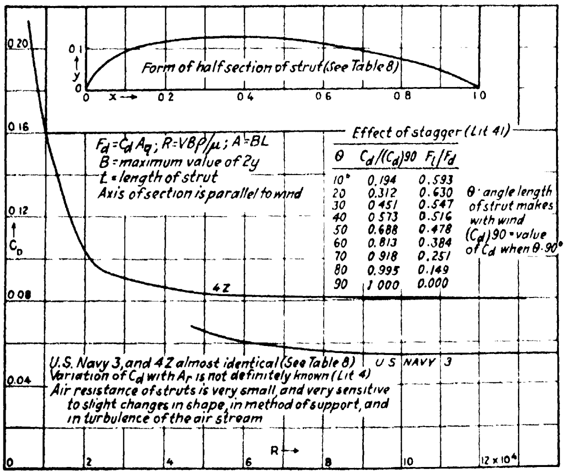


Fig. 15.— Pressure distribution: airfoil (30).



$F_d = C_d A q$; $R = VB\rho/\mu$; $A = BL$
B = maximum value of 2y
L = length of strut
Axis of section is parallel to wind

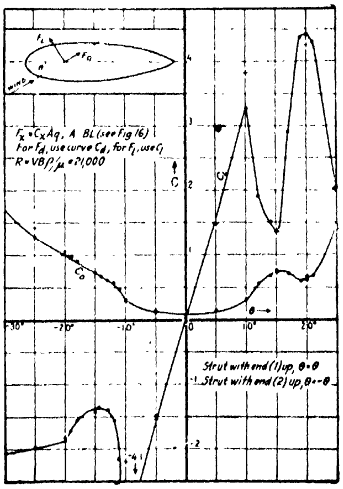
Effect of stagger (Lit 41)

θ	$C_d/(C_d)90$	F_l/F_d
10°	0.194	0.593
20	0.312	0.630
30	0.451	0.547
40	0.573	0.516
50	0.688	0.478
60	0.813	0.384
70	0.918	0.251
80	0.995	0.149
90	1.000	0.000

θ = angle length of strut makes with wind
$(C_d)90$ = value of C_d when θ = 90°

U.S. Navy 3, and 4Z almost identical (See Table 8)
Variation of C_d with A_r is not definitely known (Lit 4)
Air resistance of struts is very small, and very sensitive to slight changes in shape, in method of support, and in turbulence of the air stream

Fig. 16.—Air force on long struts (40, 64, 78, 79).



$F_x = C_x A q$, $A = BL$ (see Fig 16)
For F_d, use curve C_d, for F_l, use C_l
$R = VB\rho/\mu = 21{,}000$

Strut with end (1) up, θ = θ
Strut with end (2) up, θ = −θ

Fig. 17.—Air force on strut 4Z: inclined (88), see also (4).

TABLE 7.—CHARACTERISTICS OF AIRFOIL SECTIONS

$A_r = 6$; model 36 in. by 6 in.; $V = 40$ mi./hr; $R(= \rho Vc/\mu) =$ 181 000; tunnel diameter = 7.5 ft. (57). θ_A is measured from reference plane AB (see Figs. 22, 23, 24); x and y are rectangular coordinates of points on surface of airfoil (y_u, y_l refer to upper and lower surface, respectively); x is measured in plane AB. Unit of x and of y is 1% of chord. For additional data for these and other sections see (12, 13, 14, 34, 37, 68, 69, 70, 73, 80, 81).

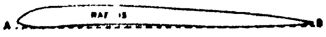
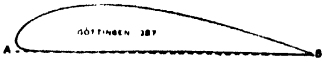
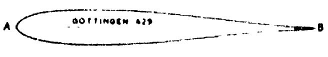
Form			Aerodynamical characteristics					
x	y_u	y_l	θ_A	C_l	C_d	F_l/F_d	x_c/c	C_M
0.00	0.30	+0.30						
1.25	1.90	−0.35	Fig. 22.					
2.50	2.85	−0.70	−4°	−0.18	0.025	−7.3	–	–
5.00	3.95	−1.05	−2°	−0.04	0.014	−2.8	–	–
7.50	4.65	−1.15	−1°	+0.03	0.013	+2.6	0.966	0.029
10.00	5.05	−1.20	0°	0.14	0.013	10.7	0.479	0.067
15.00	5.55	−0.85	1°	0.24	0.013	18.8	0.407	0.098
20.00	5.78	−0.55	2°	0.32	0.016	20.0	0.367	0.117
30.00	5.80	−0.10	4°	0.46	0.023	20.0	0.321	0.148
40.00	5.60	−0.03	6°	0.61	0.033	18.4	0.302	0.185
50.00	5.23	−0.24	8°	0.76	0.047	16.2	0.297	0.228
60.00	4.65	−0.50	10°	0.89	0.061	14.7	0.288	0.260
70.00	4.05	−0.65	12°	1.00	0.083	12.1	0.281	0.286
80.00	3.30	−0.65	14°	1.02	0.124	8.2	0.298	0.313
90.00	2.30	−0.30						
95.00	1.68	0.00						
100.00	0.65	+0.34						
0.00	0.00	0.00						
1.25	2.02	−1.65						
2.50	2.71	−2.45						
5.00	3.67	−3.46	Fig. 23.					
7.50	4.47	−4.10	−4°	−0.26	0.014	–	–	–
10.00	4.95	−4.57	−2°	−0.10	0.012	−8.8	–	–
15.00	5.37	−5.27	0°	+0.04	0.013	+3.1	0.197	0.008
20.00	5.69	−5.58	2°	0.18	0.015	12.4	0.224	0.040
30.00	5.69	−5.69	4°	0.33	0.020	17.2	0.229	0.076
40.00	5.32	−5.27	6°	0.50	0.028	17.5	0.241	0.121
50.00	4.68	−4.52	8°	0.65	0.040	16.2	0.242	0.159
60.00	3.72	−3.56	10°	0.78	0.054	14.6	0.244	0.193
70.00	2.61	−2.39	12°	0.88	0.076	11.6	0.246	0.220
80.00	1.60	−1.44	14°	0.73	0.170	4.3	0.234	0.181
90.00	0.69	−0.74	16°	0.70	0.239	2.9	0.382	0.293
95.00	0.37	−0.43						
100.00	0.16	−0.16						
0.00	3.61	3.61						
1.25	6.74	1.35	Fig. 24.					
2.50	7.98	0.80	−8°	−0.07	0.071	−0.9	–	–
5.00	9.86	0.35	−6°	+0.08	0.031	+2.6	1.410	0.109
7.50	11.32	0.18	−4°	0.22	0.024	9.4	0.684	0.150
10.00	12.40	0.09	−2°	0.37	0.026	14.3	0.507	0.188
15.00	13.83	0.00	0°	0.51	0.031	16.4	0.436	0.222
20.00	14.77	0.07	2°	0.66	0.039	16.9	0.396	0.261
30.00	15.36	0.21	4°	0.81	0.051	15.9	0.369	0.300
40.00	14.88	0.37	6°	0.96	0.067	14.3	0.348	0.336
50.00	13.47	0.54	8°	1.10	0.084	13.0	0.337	0.374
60.00	11.59	0.54	10°	1.23	0.104	11.8	0.323	0.403
70.00	9.27	0.54	12°	1.33	0.125	10.6	0.307	0.416
80.00	6.57	0.49	14°	1.42	0.148	9.6	0.312	0.454
90.00	3.61	0.27	16°	1.43	0.182	7.9	0.315	0.466
95.00	1.99	0.16	18°	1.42	0.213	6.7	0.327	0.486
100.00	0.36	0.00	20°	1.41	–	–		

TABLE 8.—FORM OF STRUTS; U. S. NAVY 3, BRITISH 4Z

(See Fig. 16) (These struts give as small a C_d as any)
Unit = axial length of section

x	$2y$		x	$2y$		x	$2y$	
	U.S.N. 3	4Z		U.S.N. 3	4Z		U.S.N. 3	4Z
0	0	0	0.250	0.240		0.700	0.184	0.182
0.025	0.092		0.300	0.247	0.250	0.750	0.164	
0.050	0.132	0.122	0.350	0.250		0.800	0.142	0.142
0.075	0.159		0.400	0.250	0.246	0.850	0.116	
0.100	0.180	0.182	0.450	0.250		0.900	0.085	0.094
0.125	0.197		0.500	0.240	0.234	0.950	0.049	
0.150	0.210		0.550	0.230		1.000	0.000	0.000
0.175	0.220		0.600	0.215	0.212			
0.200	0.229	0.240	0.650	0.201				

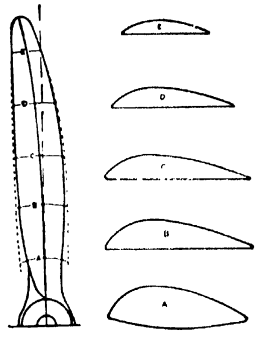


FIG. 18.—Durand's $F_2A_1S_1P_1$ propeller family. Pitch ratio constant. (Members differ only in pitch ratio.)

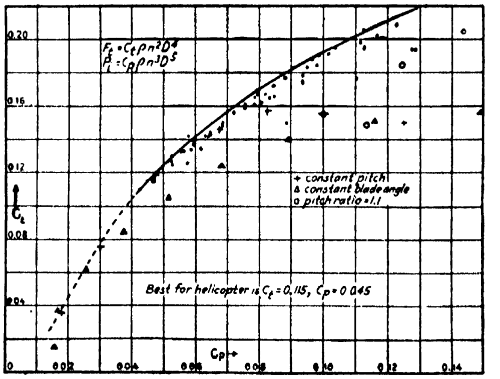


FIG. 19.—Characteristics of Durand propellers at a fixed point (8, 10).

Elongated stream-line solids of revolution have a small resultant drag, which varies greatly with turbulence of air stream, position of neighboring bodies, and slight changes in form. The area entering into the expression $F = CAq$, is generally taken either as the area of maximum section normal to the length, or as (volume)$^{2/3}$. C varies with the Reynold's number. When $A =$ (volume)$^{2/3}$, the minimum value of C for large values of R, and for bodies which are 4 to 5 diameters long, is of the order of 0.014. When $A =$ sectional area, the minimum value of C is of the order 0.03, and is obtained with bodies shorter than 4 diameters. Their equilibrium when parallel to the air stream is unstable; adding fins gives stability and greatly increases their drag (23, 35, 39).

Propellers.—Propellers are usually divided into families in which pitch-ratio and diameter are the only variables. Blade thickness and outline are usually determined largely by structural considerations; if the average thickness and width of blade are fixed, other variations have small effect upon attainable efficiency (8, 9, 15, 19, 65, 66, 71, 76, 77).

The characteristics of a propeller working at a fixed point may be expressed by two dimensionless coefficients, C_t and C_P, defined by the equations $F_t = C_t\rho n^2D^4$ and $P_i = C_P\rho n^3D^5$. For most propellers, there is, between C_t and C_P, a functional relation which is nearly independent of the design, provided large blade angles are not used (33). In Fig. 19, the curve indicates the most favorable results; marked departures from the curve occur mainly with propellers of high pitch ratio, or of constant blade angle.

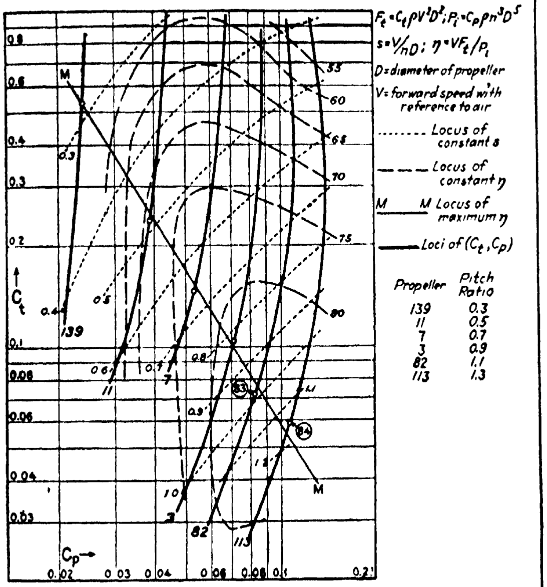


FIG. 20.—Characteristics of advancing Durand $F_1A_1S_1P_1$ propeller family (8).

The characteristics of propellers at various forward speeds (V) and speeds of rotation may be expressed by curves showing the relationships between three parameters. In Fig. 20, the parameters used are C_t, C_P, and s or η, defined by the equation $F_t = C_t\rho V^2D^2$, $P_i = C_P\rho n^3D^5$, $s = V/Dn$; $\eta = C_ts^3/C_P$, and D = diameter of the propeller. Useful range of C_t is 0.05 to 0.25; of C_P is 0.04 to 0.16. Data given are for propellers of two blades; increasing the number of blades, displaces the curves upwards and to the right.

Wind mills.—Quite different principles control the designing of wind mills which derive power from natural winds, and of those (such as the small wind mills used on airplanes for driving fuel pumps, etc.) which derive their power from the motion of a power driven craft. In the former, the controlling factor is the cost per unit of power developed; in the latter, it is the power consumed per unit of power, or torque load, developed.

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(For a key to the periodicals see end of volume)

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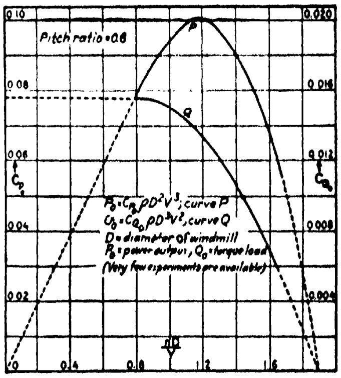

FIG. 21.—Characteristics of two blade windmill (17).

(40) Powell, *300*, No. **416**. (41) *Ibid*, No. **599**. (42) Prandtl, *297*, No. **116**. (43) Rayleigh, *300*, No. **39**. (44) Reid, *298*, No. **209**. (45) Relf, *300*, No. **102**. (46) Relf and Powell, *300*, No. **307**. (47) Riabouchinski, *303*, **4**: 43, 56; 12. (48) *Ibid.*, **4**: 113; 12. (49) *Ibid.*, **5**: 73; 14.

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LITERATURE REFERENCES

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KEY TO THE PERIODICALS

Data regarding the **libraries** which receive many of these periodicals **may be found through the following sources:**

United States and Canada: "Periodicals Abstracted by Chemical **Abstracts, 1926**" (Chemical Abstracts, Ohio State Univ., Columbus, Ohio); "Union List of Serials in the Libraries of the **United States and Canada, 1925–** " (H. W. Wilson & Co., New York City); "A Catalogue of Scientific Periodicals in Canadian Libraries, 1924" (McGill Univ., Montreal, Canada).

Great Britain: "A World List of Scientific Periodicals Published in the **Years 1900–1921**" (Oxford Univ. Press, London, 1925–)

Holland: "Chemisch Jaarboekje tevens Jaarboekje der Nederlandsche Chemische Vereeniging, vol. 3." (Amsterdam, D. B. Centen, 1920.)

1. Journal of the American Chemical Society.
2. Physical Review.
3. London, Edinburgh and Dublin Philosophical Magazine and Journal of Science.
4. Journal of the Chemical Society, London
5. Proceedings of the Royal Society (London). A Mathematical and Physical Sciences.
6. Annales de chimie et de physique. *See also* Nos 14 and 16
7. Zeitschrift für physikalische Chemie, Stochiometrie und Verwandtschaftslehre.
8. Annalen der Physik. [Journal der Physik, 1790–1794. Neues Journal der Physik, 1795–1796. Annalen der Physik, 1799–1819; Annalen der Physik und der physikalische Chemie, 1819–1824 (Gilbert). Annalen der Physik und Chemie, 1824–1899 (Poggendorff, Wiedemann). Annalen der Physik, 1900– (Drude, Wien and Planck).]
9. Zeitschrift fur Elektrochemie und angewandte physikalische Chemie.
11. American Chemical Journal. Combined with No. 1 in 1914
12. American Journal of Science.
13. Annalen der Chemie, Justus Liebig's.
14. Annales de chimie.
16. Annales de physique.
18. Archives Néerlandaises des sciences exactes et naturelles. Series III A. Sciences exactes
19. Arkiv för Kemi, Mineralogi och Geologi
21. Astrophysical Journal.
22. Atti della reale accademia nazionale dei Lincei. (Rendiconti classe di scienze fisiche, matematiche e naturali.)
24. Atti del reale istituto Veneto di scienze, lettere ed arti.
25. Berichte der deutschen chemischen Gesellschaft
26. Berichte der deutschen physikalischen Gesellschaft. *See also* No. 96.
27. Bulletin de la société chimique de France.
28. Bulletin de la société chimique de Belgique.
29. Bureau of Mines, Bulletins.
31. Bureau of Standards, Scientific Papers.
31A. Bureau of Standards, Bulletin
32. Bureau of Standards, Technologic Papers.
33. Chemical and Metallurgical Engineering.
34. Comptes rendus hebdomadaires des séances de l'académie des sciences, de l'institut de France.
36. Gazetta chimica italiana.
38. Journal of the American Ceramic Society.
41. Journal of the Chemical Society of Japan (Nippon Kwagaku Kwai Shi)
42. Journal de chimie physique.
45. Industrial and Engineering Chemistry
47. Journal of the Institute of Metals, London.
48. Journal of the Optical Society of America and Review of Scientific Instruments.
50. Journal of Physical Chemistry.
51. Journal de physique et le radium. *See also* No. 109.
53. Journal of the Russian Physico-Chemical Society.
54. Journal of the Society of Chemical Industry.
55. Kolloid-Zeitschrift (*Formerly* Zeitschrift für Chemie und Industrie der Kolloide.)
57. Monatshefte für Chemie und verwandte Teile anderer Wissenschaften.
58. Nature, London.
59. Nuovo Cimento.
62. Philosophical Transactions of the Royal Society of London.
63 Physikalische Zeitschrift.
64P Proceedings of the Royal Academy of Sciences of Amsterdam.
64V. Verslag koninklijke Akademie van Wetenschappen te Amsterdam.
65 Proceedings of the American Academy of Arts and Sciences.
67. Proceedings of the Physical Society of London.
68. Proceedings of the Royal Society of Edinburgh.
69. Proceedings and Transactions of the Royal Society of Canada.
70. Recueil des travaux chimiques des Pays-Bas.
72 Rendiconti reale istituto Lombardo de scienze e lettere.
75. Sitzungsberichte Akademie der Wissenschaften in Wien, mathematisch-naturwissenschaftliche Klasse.
76. Sitzungsberichte der preussischen Akademie der Wissenschaften.
77. Stahl und Eisen.
78. Transactions of the American Electrochemical Society.
80. Transactions of the American Institute of Mining and Metallurgical Engineers
83. Transactions of the Faraday Society.
88. Verhandlungen der physikalischen Gesellschaft zu Berlin. *See also* No 96
89. Wissenschaftliche Abhandlungen der physikalisch-technischen Reichsanstalt.
91. Zeitschrift fur analytische Chemie.
92. Zeitschrift fur angewandte Chemie.
93. Zeitschrift fur anorganische und allgemeine Chemie.
94. Zeitschrift fur Krystallographie. (*Name changed in* 1921 *from* Zeitschrift für Kristallographie und Mineralogie.)
95. Zeitschrift fur Metallkunde.
96. Zeitschrift für Physik. (Verhandlungen der physikalischen Gesellschaft zu Berlin, 1882–1898; Verhandlungen der deutschen physikalischen Gesellschaft, 1899–1902; Berichte der deutschen physikalischen Gesellschaft, 1903–1919; Zeitschrift für Physik, 1920– .)
98. Zeitschrift des Vereines deutscher Ingenieure.
101. Elektrotechnische Zeitschrift
105. Journal of the Society of Glass Technology.
112. Dinglers polytechnisches Journal.
115. Engineering.
119. Proceedings of the American Institute of Electrical Engineers.

128. *Journal of the Washington Academy of Sciences.*
132. *Anales de la sociedad española de física y química.*
133. *British Association for the Advancement of Science, Reports.*
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139. Ferrum.
140. Journal of the Iron and Steel Institute, London.
141. Journal of Biological Chemistry.
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144. Mathematikai és Természettudományi Értesitö, Budapest.
147. Meddelanden från K. Vetenskapakademiens Nobelinstitut.
149. Archives des sciences physiques et naturelles. (Bibliothèque brittanique, 1796–1815; Bibliothèque universelle des sciences, belles-lettres et arts, 1816–1835; Bibliothèque universelle de Genève, 1836–1845; Supplément à la bibliothèque universelle de Genève. Archives des sciences physiques et naturelles, 1846–1847; Bibliothèque universelle de Genève. Archives des sciences physiques et naturelles, 1848–1857; Bibliothèque universelle, revue suisse et étrangère. Archives des sciences physiques et naturelles, 1858–1861, Bibliothèque universelle et revue suisse. Archives des sciences physiques et naturelles, 1862–1877; Bibliothèque universelle Archives des sciences physiques et naturelles, 1878– .)
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153. Minutes of Proceedings of the Institution of Civil Engineers.
156. U. S. Geological Survey, Bulletin.
159. Science Reports of the Tôhoku Imperial University.
166. Science.
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173. Analyst, London.
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176. Chemisch Weekblad, Amsterdam.
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188. Nachrichten von der königlichen Gesellschaft der Wissenschaften zu Göttingen. Geschaftliche Mitteilungen; mathematisch-physikalische Klasse.
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190. Neues Jahrbuch für Mineralogie, Geologie und Paläontologie.
196. Sammlung chemischer und chemisch-technischer Vortrage.
197. Proceedings of the National Academy of Sciences.
198. Revue générale des sciences pures et appliquées
199. Le Radium. (Merged into No. 51 in 1920.)
200. Jahrbuch der Radioaktivität und Elektronik.
201. Proceedings of the Cambridge Philosophical Society.
202. Zeitschrift für physiologische Chemie.
205. Biochemische Zeitschrift.
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208. Physica, Nederlandsch Tijdschrift voor Natuurkunde.
209. Japanese Journal of Chemistry.
210. Scientific Papers, Institute of Physical-Chemical Research, Tokyo.
211. Abhandlungen der mathematisch-physischen Klasse der sächsischen Akademie der Wissenschaften zu Leipzig.
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213. Sitzungsberichte der mathematisch-physikalischen Klasse der Bayerischen Akademie der Wissenschaften zu München
214. *Kongelige Danske Videnskabernis Selskab, Skrifter naturvidenskabelig og mathematisk Afdeling.*
215. *Lunds Universitets Årsskrift.*
216. Giornale di chimica industriale ed applicata. (Annali di chimica applicata, 1914; *continued as* Giornale di chimica applicata; *combined with* Giornale di chimica industriale, *March,* 1920, *to form* Giornale di chimica industriale ed applicata.)
217. U. S. Coast and Geodetic Survey, Special Publications.
218. Naturwissenschaften.
219. Proceedings of the Physico-Mathematical Society of Japan.
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222. Giornale di mineralogia, cristallografia e petrografia.
223. Journal of General Physiology.
224. Kosmos, Stockholm.
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241. Proceedings of the American Philosophical Society.
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252. Chemische Umschau auf dem Gebiete der Fette, Oele, Wachse und Harze. (*Before* 1916 Chemische Revue über die Fett- und Harz Industrie.)
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254. Zeitschrift für Beleuchtungswesen, Heisungs- und Lüftungstechnik.
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8 NOV. 1928

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